The Eastern Promise

Progress Report on the EU Renewable Electricity Directive in Accession Countries

January 2004

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Foreword

In 2001, as its first legal measure to reduce greenhouse gases under the Kyoto Protocol, the European Union adopted the Directive for the Promotion of Electricity from Renewable Energy Sources (RES), also known as the Renewables Directive. This European law aims to boost green power in the Union by setting minimum national targets for 2010 and mandating governments to address the financial and bureaucratic obstacles hindering renewable energy development.

WWF and its partner NGOs strongly support the implementation of the Renewables Directive because –aside from the environmentally benign nature of renewable energy– an increase in the use of renewable energy in Europe can bring real economic and social advantages to society in terms of job creation, rural development, technology innovation, and energy security.

The extension of the Renewables Directives to the Accession Countries is a challenge, yet with great opportunities. The countries that are set to join the European Union have a huge potential for biomass energy –a less known yet key green energy source. Accession to the EU will also be accompanied by accelerating pressure on the agriculture sector, which is still employing around 20% of the entire workforce in the Region, more than three times the level in the current Member States.

If developed properly, biomass-based energy can offer a new opportunity for sustainable developed in the region. It can provide a new income stream for farmers while ensuring a sustainable agriculture development path. Trade within the Enlarged Union could also mean the region becoming a net exporter of electricity produced from renewable sources.

This report is aimed at providing a first qualitative and concise assessment of the progress that has been made to date in developing favourable policy and regulatory frameworks for renewable energy across eight future Member States. In the region, there is a significant investment potential for new renewable energy capacity – estimated at between € 18-40 billion over the next 16 years. But to attract this investment flow, financial incentives for renewable power should be urgently refined in order to provide the predictability of return on investments that project developers need.

The next six months will be crucial to begin ensuring that the right incentives are adopted, while all barriers are removed. The formal accession of new Members is set for the 1st of May 2004 by which time the provisions of the Renewables Directive should be enacted into national law. A month later, Germany will host the Bonn International Renewable Energy Conference. These two occasions offer an historic opportunity for the enlarged Europe to show its global leadership on renewable energies.

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Summary

The Renewable Electricity Directive is a vital policy tool to assist the EU in the development of a sustainable energy sector[1]. In 2003 WWF published a progress report[2] on how far current Member States had developed policies and programmes to enable them to meet the national indicative targets of the Renewables Directive, namely that by 2010 renewable generators should provide 22% of electricity in the existing states of the EU.

On the eve of the enlargement of the EU to 25 Members, WWF, in co-operation with NGOs and independent institutes, have surveyed the progress made by continental accession countries in meeting the requirements of the Renewables Directive. Also in mid 2004 all Member States in an enlarged EU will have to have transposed the revised Directive on the electricity market[3]. This Directive has a number of requirements that will assist in the development of sustainable energy systems.

Currently the deployment of renewable energy in accession countries is not as advanced as those in current Member States and consequently the Directive has lower targets for new members: by 2010 an average of 11.1% of electricity demand must come from renewable electricity. However, given the current low level of deployment even this target will require a greater increase in the use of electricity from renewable sources than for existing Member States. Consequently, every effort must be made to facilitate this rapid increase if the individual targets are to be met:

- *Effective support schemes*. To enable the further deployment of renewables most continental Accession Countries have already or in the process of deploying feed-in tariffs. Experience in current Member States has shown that assuming an appropriate tariff is given, the feed-in tariffs can significantly enhance the use of renewables, as has been seen in Germany and Spain. Feed-in tariffs have been successful in developing the wider use of renewables as they can give additional financial security, however, for this to occur clear guidelines and relatively long – between 10-15 years – guarantees for prices need to be available.

- *Streamlined and fair rules*. It is clear that further policy reform is needed in accession countries to ensure that fair and transparent procedures are put in place to enable renewable generators to access the grid and ideally that priority is given for renewably generated electricity. In addition administrative procedures must be streamlined to enable new capacity to be introduced in a timely manner.

- *Power disclosure*. No accession country has yet introduced legislation requiring final consumers to be supplied with information on the generation mix of the suppliers and their resultant pollutants, at least the CO_2 and nuclear waste produced. Immediate efforts must be made by legislators and industrialists to meet the disclosure requirements of the revised electricity market Directive.

[1] Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the Promotion of electricity produced from renewable energy sources in the internal electricity market. Official Journal of the European Communities, 27th October 2001, L283/33.
[2] WWF EPO, 2003, Progress Report on the Implementation of the European Renewables Directive, Brussels.
[3] Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC.

1. Introduction

The material for this report was collected and analysed by NGOs experts in each country reviewed. The material sourced is both from Government energy policy plans and independent reviews for the actual and potential deployment of renewable energy sources. This data was then compared and contrasted to produce a regional analysis of the mechanisms deployed to enable new Member of the EU to meet the requirements for the Renewables Directive.

2. Benefits of Renewable Energy

Energy demand in accession countries is expected to increase over the next twenty years, as economic development and income levels grow. Meeting energy and in particular electricity demand in a economically and environmentally sustainable manner will be a challenge for many accession countries because of the current over-capacity in electricity production, high dependence on fossil fuels imports and inefficient end use of energy.

In this context, renewable energy sources (RES) can play a crucial role in future energy supply by providing the following benefits:

- *Create employment and support rural development*. The renewable energy industry is one of the EU's fastest growing sectors. Renewable energy technologies in general are more labour intensive than conventional energy technologies, in delivering the same amount of energy output. For instance, in Germany the renewable energy sector already employs 130,000 people. An EU-funded study has forecasted that such figure could reach over 900,000 new jobs by 2020 in the EU 15, with the vast majority of employment created in bioenergy technologies, together with biomass fuel provision[4]. Given the large biomass potential found in Central and Eastern Europe, accession countries could benefits significantly from renewable energy markets. For example, it is forecasted that the Renewable Energy Strategy will create an addional 30 to 40,000 jobs by 2020 while in the Czech Republic around 60,000 additional jobs by 2030 will come from green energy.

- *Attract investment to modernise obsolete production facilities*. There is a significant investment potential for new renewable capacity in the eight countries studied, as shown in the Table 1. If the technical potential for renewable energy were met it would require investment of between € 18-40 billion ($23-50 billion) by 2020. However, a predictable legislative framework is needed to realise this investment potential.

- *Reducing import dependence and increasing energy security*. Accession countries, as with current Member States are increasing their dependency on imported energy, in particular natural gas from Russia. An accelerated program to introduce renewables electricity generators can counter this trend. Renewable electricity generators are not dependent on imported fuel and thus aid energy security.

- *Improving the quality of the local environment and fight climate change*. Unlike fossil fuel power plants renewable electricity generators produce no local or global atmospheric pollutants and therefore assist in reducing CO_2 emissions and meeting Kyoto targets. It has been calculated that the full implementation of the Renewables Directive by the current 15 Member States would result in a 6% cut of total EU CO_2 emissions in 2010.

Table 1: Investment Potential in Continental Accession Countries by 2020

Renewables Energy Sources	Technical Potential 2020 (MW)	Capital Cost ($/kW)	Investment Potential (million $)
Wind	8600	1000-1400	8,600-12,400
Geothermal	10	2500-3500	25-35
Biomass	7261	1400-2500	10,165-18,153
Hydro	3424	1250-6000	4,280-20,544
Total			**23,070-51,132**

Source: EBRD, Black and Veatch[5]

[4] ECOTEC (1998) The Impact of Renewables on Employment and Economic Growth, Report for the Altener Programme, Brussels.

[5] Strategic Assessment of the Potential for Renewable Energies in EBRD Countries of Operation, Black and Veatch, April 2003, tables 1-4 and 4-12 http://projects.bv.com/ebrd/pub.htm

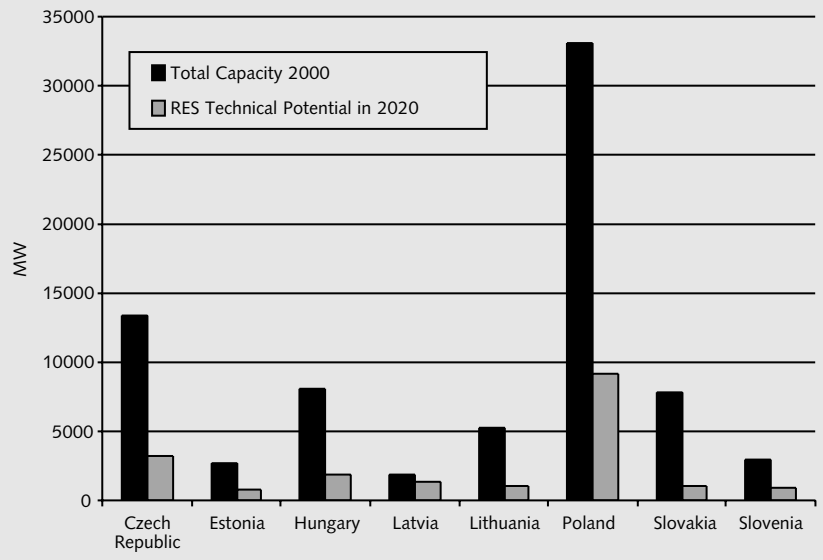
3. Potentials in the Region

There is considerable renewable energy potential in Central and Eastern Europe. The region is reach in agriculture land and covered with forests: the potential for biomass is well documented and quite large. Significant wind resources can be found along the Baltic and Black seas, and the mountainous areas in Central Europe. And there is also a good potential for refurbishing existing small hydro plants and building new ones.

A study commissioned by the European Bank for Reconstruction and Development (EBRD) concluded that if the technical potential of the eight continental accession countries was reached by 2020 the installed capacity could increase by 50% over current levels. This would enable renewables to play a significant role in electricity generation as can be seen in Figure 1 –which compares the total installed power capacity (i.e. conventional and renewables) in 2000 with the potential for renewable power in 2020.

The study forecast that the longer term potential is immense and in the region as a whole – including Russia and other Eastern European countries. For wind power alone, according to the EBRD study, a total capacity across accession and eastern European countries of 3500 GW could be achieved, compared to current installed capacity for all electricity sources of 440 GW.

Figure 1. Total Installed Power Capacity vs RES Technical Potential in 2020 (MW)



Source: EBRD, European Commission[6]

[6] Ibid, European Commission, European Energy and Transport Trends to 2030, January 2003, appendix 2.

4. Summary of Country Profile Reports

Table 2 provides a qualitative assessment of the current progress made by the eight studied Accession Countries in implementing the provisions of the Renewable Electricity Directive. It shows that considerable progress is still to be made throughout the region to develop a secure and favourable policy and regulatory environment for renewable energy investments. Below the key features in each country are summarised.

Czech Republic

The average renewable power share in the Czech Republic is around 3.5%, with more than 98% of this share coming from large and small hydropower plants. The annual yield greatly depends on precipitation levels for a given year and fluctuates around 2 GWh. Installed capacity of wind generators is no more than 10 MW, against an economic potential estimated at 2,2000 MW (IEA 2003). The share of other renewable technologies is negligible. As expressed in the EU Accession Treaty, the Czech Republic has a national target of 8% renewable electricity by 2010. The potential is seen mainly in biomass, wind and increased capacity of small hydroelectric plants. According to the Environment Ministry, renewables production could increase to 15.4% in 2020 and 19.5% in 2030. This would create additional 59,000 jobs by 2030. Thus renewables would employ more than 71% of the workforce in the whole energy sector.

In January 2002 a system of feed-in tariffs was introduced. Though the tariffs

are considered relatively high, only few new renewables installations have been developed because of their short-term guaranty and administrative barriers for independent power producers. A proposal for a new mechanism, which can be described as a mix of quota system and feed-in tariffs, is currently before the Parliament and is expected to be adopted in late spring 2004. According to the new proposal, utilities will have to fulfil a certain quota of renewable electricity each year. The quota is established by monetary value, rather than energy units. The minimum prices of tradable green certificates should be differentiated by technology, guaranteed for 15 years and set in a way that the pay-back time is less than 15 years. Sources up to 0.2 MW of installed capacity and all solar electricity would not be included under the new scheme but instead be eligible for feed-in tariffs.

Given its present formulation, the act will not boost the use of renewables. The act needs to provide producers with clear long-term guaranty of production revenues on a level that ensures reasonable pay-back time and profit. Compulsory annual targets, clear and favourable conditions for green certificates prices and monetary quotas setting and sound penalties are all key to success. Finally, administrative procedures have to be streamlined, while keeping safeguards for nature conservation.

Estonia

The main Estonian energy resources include oil shale, peat and wood fuels. The oil shale resource in already opened mines is sufficient to cover the present consumption level at least for the next 30 years. The target for renewable electricity, as negotiated in the Accession Treaty, is 5.1% of renewable electricity by 2010, against a share of 0.2% in 1999. The technical wind power potential is very high, followed by biomass energy. The feed-in tariff applied to the prices of the major producer, Narva Power was 0.76 EEK/kWh, i.e. 0.0486 EUR in 2003 (the same tariff is applied to all capacities and types of installation). The renewable tariffs should amount to at least 1 EEK/kWh in order to be sufficient to guarantee investors' security. On paper, the Electricity Market Act grants independent power producers free access to the network. In practice, however, grid access for independent power is rather limited in certain areas due to the shortage of grid capacity.

The main barrier to renewable energy is the lack of financial incentives for developers. Today's support schemes for renewables do not ensure that investors get their investments paid back in less than ten years, which makes financing of renewables projects difficult. For wind power developers, another obstacle is the fact that the grid does not extend to the most suitable areas for wind-projects – the western coast and islands. In addition these areas are mostly valuable sites for nature protection and/or recreation, thus creating conflicts between different interests. Concerning biomass combined heat and power (CHP), there are not enough district-heating customers in small cities to make it economically feasible.

Hungary

In 2003, the share of renewables in the total primary energy supply was 3,6%. According to the government's Strategy for Energy Conservation and Improving Energy Efficiency, the share of renewables should be doubled to at least 5% by 2010. However, against a 0,5% share of renewable power in 2003, the Accession Treaty sets a low target of 3,6% by 2010. This is the equivalent of approx. 1400 GWh – which is expected to be supplied by 186 GWh of hydropower, 700 GWh of biomass, 400 GWh of waste incineration, 50 GWh of sewage treatment, and a about 50 GWh produced wind energy. Although there is not national assessment of Hungary's wind energy potential, the largest wind power Austrian park is being built just across the border.

The new Electricity Act came into force on 1 January 2003, implementing a feed-in tariff system and a preferential grid access for renewable energy producers. However, the current system may end-up promoting too few renewables projects. In 2003, the feed-in tariff was on average 17.41 HUF/kWh (6.6 € cents/kWh). This single price support scheme is favourable only for wind power, while it proves not to be enough to support other renewable technologies. According to the Electricity Act, renewable energy systems are only allowed to connect to the grid using preferential rights if their capacity is greater than 0.1 MW capacity. This prevents many small power plants from gaining access to the grid. Furthermore, projects are hindered by complicated and lengthy administrative procedures – which unnecessarily slow down the process of development.

Latvia

The total installed generating capacity of electrical power plants in Latvia at the end of 2002 was 2,057.5 MW. In 2003, the share of renewable energy (mainly hydro) in the total energy production in the country was about 75%. This however is valid for only about 4 months per year, when conditions are all good for utilization of hydropower. For the rest of the year, Latvia imports electricity from Lithuania and Estonia in order to balance the electricity demand. Latvia has a renewable power target of 49.3% by 2010, compared to 42.4% in 1999. The future increase in green power will result mainly from more use of biomass in CHP plants (325 MWe to 2020). Every year, the Cabinet of Ministers defines the maximum volumes for renewable energy generation. For example, in the year 2002 the total volume for the installation of capacities was limited by the government to 30 MW, including 10 MW of small hydro-power (≤ 2 MW); 10 megawatts of energy from biomass, forestry or peat; and 10 MW of waste to energy and biogas. By the year 2005, the government ruled that the increase of the average electricity sales tariff, due to the introduction of new renewable energy sources, should not exceed 5%, corresponding to approximately 6% of renewable electricity (large hydro power plants excluded). In January 2003, the revision of the renewable energy regulations lowered the feed-in tariffs and made them subject to approval by the Regulator.

The development of renewable energy project is limited by a number of administrative barriers. To start a project the investor must have a permit within a yearly quota of renewable electricity, which is issued by the Ministry of Economy. In recent years, the quotas defined have been very small (e.g. 30 MW in 2002) and even these were not used to their complete potential because of the prohibitive conditions for grid connections and de facto exclusion of large projects. The administrative procedures for the use of land, environmental requirements, and connection to the grid are complex. Finally, the constant changes in the legislation, e.g. quotas being restricted and feed-in tariffs lowered, do not guarantee a stable environment for investors.

Lithuania

Total installed power capacity exceeds the present domestic consumption by almost three times, which is the reason why Lithuania exports power to other countries. In 2001, the largest power plant in Lithuania generated 11.36 TWh, equal to 77% of the total electricity generation (around 15 TWh). The Lithuanian electricity market is expected to go through great changes in the coming years. According to the Lithuanian National Energy Strategy, it has been decided to close down Unit 1 of Ignalina nuclear power plant by the end of 2004 and Unit 2 by 2009.

According to the Accession Treaty, Lithuania has a renewable power target of 7% by 2010. It is expected that targets shall be reached by harnessing the national wind, biomass and hydropower resources. For instance, current wind capacity is about 23 MW, but the potential capacity is estimated to be 550 MW. Small hydro offers a significant potential as well, especially in the area of reconstructing and renovating existing plants and adding small hydropower plants to water management projects. The utilisation of renewable energy sources has been identified as a priority in many policy documents. Electricity produced in RES installations is granted grid priority and relatively high Feed-in Tariffs. Generally renewables installations producing electricity in Lithuania are given preferential prices. The feed-in tariffs are guaranteed for 10 years of plant's operation. The suppliers are obliged to buy electricity produced from renewable and waste energy sources by generators connected to the transmission network and to sell it to their customers. The definition of renewable energy sources –which includes municipal solid waste and peat – is not in compliance with the EU Renewables Directive and should be amended.

Poland

Coal-fired power and combined heat and power (CHP) plants dominate electricity generation in Poland, as shown by the fact that in 2001 the share of coal in electricity generation was 96.26 %. The share of renewable electricity in 2002 was 2.61%, with large hydro (> 5 MW capacity) making the biggest contribution, equal to 53.5%, followed by small hydro with 24%, biomass with 17%, biogas with for 5%, and wind with a small 0.5%. If one excludes big hydro from the share, small hydro would account for 51.5%, biomass for 36.5%, wind power for 1%, and biogas for 11%. In 2001, green power production accounted for 2.6 TWh. According to the European Safire energy model for electricity production in 2010, biomass will make the greatest contribution, with wood and straw accounting for 46% and 9% respectively, followed by wind (29%), large hydro (8%), small hydro (4%) and biogas (4%).

Poland has adopted the national renewable energy strategy and is harmonising its environmental and energy policy with those of the EU. Although targets set for the development of renewable energy sources are ambitious, Poland is not on the way to meet them, as neither the existing obligation mechanism nor the current proposal for a Renewable Energy Act seems effective in promoting new projects. There is a need to strength the existing Quota Obligation System by defining penalties and by introducing a Green Certificates System, and to create a dedicated renewable energy fund. The regulations concerning connection to the grid should also be urgently reviewed. Finally, to facilitate the siting renewable energy projects, there is a need to introduce planning regulations at national and regional level.

Slovakia

Electricity in Slovakia is mainly produced from nuclear, gas and coal power plants. The share of renewable energy sources was 16 % in 2001 – almost all from large hydropower plants. The installed capacity of other renewable sources is negligible (biomass) or zero for wind and solar. The Slovak Energy Policy produced by the Ministry of Economy does not send any message in terms of specific renewable electricity targets. In general it says that under good financial conditions it could be possible to double the share of renewables (total heat + electricity) by 2010. Nevertheless clear targets and timetables are missing. Biomass is considered as the most promising source of energy for heating. Regarding electricity, the Energy Policy defines the technical potential of power production from renewables. The Accession Treaty mandates a renewable power target of 31% y 2010, up from 17.9% in 1999.

Since April 2003, a new support scheme has been introduced whereby construction or reconstruction of renewable energy projects is eligible for support up to € 100.000. The amount of support depends on the site where the renewable energy facility is placed and can cover up to 100 % of bank interest rates, up to 75 % of investment costs or up to 25 % not-investment costs of the facility. Projects in regions with the lower GDP per capita receive higher support. This programme could be quite attractive for renewable energy operators but it is not clear yet what is the total budget allocated and if all eligible applicants will receive the support. On the other hand, the feed-in tariffs set by the distributing companies are extremely low – recently at the level of 3 EUR cents/kWh for all kinds of renewables. As a result, most of the potential projects will have long payback periods what is usually not acceptable for the domestic banks to finance such a project.

Slovenia

In 2001 the share of renewables in gross electricity production was 27.9 % of which almost 99 % was hydropower, and remaining 1 % biomass (mostly CHP based on wood, landfill gas and water treatment gas). The renewable power is produced as follows: 25.5 % by large-scale hydropower (> 10 MW), 2.0 % by small-scale hydropower (< 10 MW), and 0.37 % is estimated to be biomass. Slovenia has a target of 33.6 % renewable power by 2010, compared to a share of 29.9 in 1999.

Presently, a feed-in tariff is the main policy instrument for the support of electricity production from renewables. Whereas all small power plants (up to 10 MW) have been supported by feed-in tariffs since the mid-80's, from early 2002 a new system of feed-in tariffs has been in operation based on priority dispatch of qualified production. The difference between the market price and the feed-in tariff is covered by network charges, paid by all electricity customers. Network operators are obliged to conclude long-term feed-in contracts with renewable power producers also called qualified producers (QPs). Feed-in tariffs are relatively advantageous for wind power, but not for other technologies including PV. The main obstacles for the flow of investments to the renewables sector is the unclear and complex administrative procedure for getting the status of Qualified Producers, a precondition for eligibility to the feed-in system.

Table 2: Accession Countries Progress on Renewable Electricity						
COUNTRY INDICATOR	**TARGET**	**DEFINITION OF RENEWABLE SOURCES**	**FINANCIAL SUPPORT**	**GRID ACCESS**	**ADMINISTRATIVE PROCEDURES**	**OVERALL SCORE**
Lithuania	2/4*	1/4 Not- EU compliant, as it includes municipal solid waste and peat	4/4 Feed-in Tariffs	3/4 Priority Access	3/4 Appropriate	**13/20**
Czech Republic	3/4 Quite ambitious though not binding only indicative	4/4 EU compliant Exclusion of mixed waste incineration	2/4 Current scheme: Feed-in-Tariff, but only short-term guarantee. Proposed scheme: Quota System with guaranteed and differentiated prices of green certificates	3/4 Priority Access, RES operators pays all new connection costs, grid operator pays for strengthening of grid where needed.	1/4 Complicated	**13/20**
Poland	3/4 National target smaller than EU target, but the target is ambitious	4/4 EU compliant Municipal waste incineration excluded	2/4 Quota System High quotas but lack of effective and motivating sanctions for non compliance and stable revenues	1/4 No priority access Generators pay 25% for grid extension and strengthening if the investment is within the framework of 'Principles for the community plan of heat, electricity and gas supply'. However not all energy utilities apply this regulation	1/4 Complicated up to 11 procedures for new renewable deployment	**11/20**
Slovakia	1/4 No national targets for renewable power No compliance with EU Directive	3/4 EU compliant No mention of biogas	2/4 Feed-in-Tariffs Low tariffs and no differentiation between technologies, attractive scheme for direct investment support	3/4 Distributor obliged to buy renewable energy Producers responsible for connection costs	1/4 Complicated	**10/20**
Estonia	1/4 No legally binding target	3/4 EU compliant	2/4 Feed-in Tariff Low tariffs	1/4 No priority access: Generation pay for grid extensions and strengthening	3/4 Appropriate	**10/20**
Hungary	1/4 Targets are not ambitious enough	4/4 EU compliant Exclusion of waste incineration	2/4 Low Feed-in Tariff No differentiation between technologies	2/4 No priority access: Electricity suppliers are legally obliged to buy RES electricity if the application meets technical requirements. However, these are unclear except for the 100kW minimum	1/4 Complicated up to 28 procedures for new renewable deployment	**10/20**
Latvia	1/4 Annual quota (targets) are too low	3/4 EU compliant	2/4 Feed-in Tariffs Too low	3/4 Priority for cogeneration power plants	1/4 Complicated	**10/20**
Slovenia	2/4 Targets are not ambitious enough	1/4 Waste incineration is included in the feed-in tariff: however, it is not included in the definition of renewables	3/4 Feed-in Tariffs are high enough for wind, but not for solar, but in general do not enable RES to compete with conventional sources.	1/4 No priority access Generators pay for grid extension and strengthening	1/4 Complicated: up to 15 procedures for new renewable development	**8/20**

* NOTE:
Each indicator (target, definition, support scheme, grid access, administrative measures) have been given a score between 1 and 4, with 4 being the best and 1 the worst. Evaluations are qualitative and do not take into account renewable electricity potentials in the studied countries. Elaboration by the authors, based on national reports.

5. Definition of Renewable Energy Sources

The types of fuel or generators that can be included under the definition of renewables are fundamental to the development of truly sustainable energy systems. The RES Directive states in Article 2 that renewables include: *Renewable non-fossil energy sources (wind, solar, geothermal, wave, tidal, hydro-power, biomass, landfill gas, sewage treatment plant gas and biogases); 'biomass 'shall mean the biodegradable fraction of products, waste and residues from agriculture (including vegetal and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste.*

Electricity produced in hybrid plants (those that use different fuels) can be included only when fuelled by renewable energy sources. Furthermore, the Directive excludes electricity produced from storage systems i.e. electricity from pump storage systems cannot be included unless the original electricity is produced from renewable sources.

The most contentious issue is that of waste incineration. As the Directive points out only the biodegradable proportion of any waste stream can be counted as renewable. Not all existing Member States are conforming to this requirement, notably in Spain and Italy where non-biodegradable waste has been included in accounting for renewables electricity production. However, the regimes in most accession countries, for example in Czech Republic, Estonia, Hungary, Slovakia and Slovenia, only allow waste from organic sources to be included in the definitions. In Lithuania, the definition of renewable energy sources "which includes municipal solid waste and peat" is not in compliance with the EU Renewables Directive and should be amended.

Table 3: EU accession country renewable electricity production in 1999 and % targets for 2010

Country	Renewable electricity production 1999 (TWh)	1999 %	2010 %
Czech Republic	2.36	3.8	8.0
Estonia	0.02	0.2	5.1
Hungary	0.22	0.7	3.6
Latvia	2.76	42.4	49.3
Lithuania	0.33	3.3	7.0
Malta	0.00	0.0	5.0
Poland	2.35	1.6	7.5
Slovakia	5.09	17.9	31.0
Slovenia	3.66	29.9	33.6
Total	**16.8**	**5.4**	**11.1**
EU 25	**355.2**	**12.9**	**21.0**

Source: EC

Box 1. Feed-in-Tariff Systems

Feed-in systems consist of an obligation for energy utilities to purchase renewably generated electricity and to pay a minimum tariff per kWh, varying with the technology used. Usually the feed-in tariff differs between various technologies, depending on the different production costs. The amount of renewable generation is determined by the payment but there is no explicit quota. When carefully developed, major advantages of a feed-in system include: a) they are relatively fast to establish; b) they are easy to implement and can be revised for new capacities according technological developments; c) they have low administrative costs.

6. Targets

The RES Directive provides indicative targets for current Member States for electricity from renewables sources by 2010. The overall requirement was that by 2010, 22 % of electricity used should come from renewable sources and 12% of the total energy consumption. New Members to the EU have to implement the Directive by the time that they join in May 2004. The targets for new members were included in the Accession Treaties[7] and are shown in the table below. The Directive requires accession countries to double the contribution of renewable energy to electricity generation in seven years (from the time of signing the Accession Treaty). As a consequence the share of renewables in the electricity supply mix will have to increase much faster in accession countries than in existing Member States if the targets of the Directive are to be met.

7. Support Mechanisms

To facilitate an accelerated RES program Governments have a range of policy options at their disposal. This support can either be targeted at production or investment costs. The most widely adopted support mechanism within Member States is that of feed-in tariffs, which give

[7] Treaty to Accession of the European Union in 2003 Annex II, Part 12, page EN1802

Box 2. Quota Systems

Under the quota system, governments can set a quota to source a given percentage of renewable electricity for renewable electricity. The requirement to meet this target can be imposed on a variety of market actors, such as producers, suppliers or consumers. At the end of the given year, the market actor must demonstrate its compliance with the obligation, by submitting the required number of certificates, often issued as units representing 1 MWh of renewable power, to the authorities. The certificates represent the market value of the renewable quality of electricity and therefore function as an incentive per kWh of produced electricity. This mechanism is currently applied in the UK, Italy, Belgium and in Sweden.

Table 4: Summary of Feed-in Tariffs in Accession Countries (€ cents/kWh)

Country	Wind	Biomass	Hydro-Power
Czech Republic	8.5-9.4	7.9	4.9 (max 10 MW)
Estonia	4.86	4.86	4.86
Latvia	10.1	5.05	5.05-10.1 (max 2 MW)
Lithuania	7.5	6.9	6.9
Hungary	5.78-9.26	5.78-9.26	5.78-9.26
Slovakia	3.03 – 3.51	3.03 – 3.51	3.03 – 3.51
Slovenia	6.11-6.33	6.76-6.98	5.89-6.11 (max 10 MW)

Source: Author own calculation

generators a guaranteed price for their electricity (see Box 1). Currently eleven Member States have at least a partial feed-in tariff scheme (Austria, Belgium, Denmark, France, Germany, Greece, Ireland, Luxembourg, the Netherlands, Portugal and Spain). Other production support schemes include renewable obligations on producers or purchasers or green certificates to stimulate the market (see Box 2).

Most accession countries have adopted feed-in tariffs, including **Estonia, Latvia, Lithuania, Hungary, Slovakia** and **Slovenia**. However, the mechanics of these schemes vary considerably. The prices proposed vary from country to country and locality-to-locality this can be seen in the table below. The different tariffs adopted depend on a variety of issues including:

- Date of Start-up: In **Latvia** hydro plants started prior to 2003 receive double the level of funding of newer facilities and the new level is probably insufficient for investment. In the **Czech Republic** windmills erected after 1st January 2004 get a 10% lower rate than those constructed before. In **Slovenia** for plants in operation for 5 or more years the price or bonus is reduced by 5 %, for plants in operation for 10 or more years the price or bonus is reduced by 10 %,
- Source of Electricity: Only **Estonia** and **Slovakia** have a fixed price for all renewables, while others vary dependent on the generation type, i.e. wind or biomass.
- Size of Facility: In **Latvia** and **Slovenia**, larger facilities (hydro and/or biomass) have a lower fixed tariff.
- Time of Generation: In some countries the time of day and/or whether the electricity is produced in peak or low demand time affects the rate of tariff, this occurs in **Hungary** and **Slovenia**.

The main issues facing feed in schemes are that the price does not adequately cover costs and the length of time that the feed in tariffs will be in place. For new investors, medium term – 10-15 years – price security is needed to ensure an adequate rate of return on investments. In the region counties have adopted different time-scales: In **Latvia –**some feed-in tariffs are guaranteed for 8 years, in **Lithuania** up to 10 years, in **Estonia**– with up to 12 years guaranteed for renewables other than biomass (which has a 7 years guarantee). In the **Czech Republic** prices are set each year by the energy regulator and although they have remained the same for the last three years there is no long-term guarantee. The new Renewable Energy Act suggests a 15-year guarantee should be adopted.

8. Access to the Grid

Obviously unless renewable energy generators have access to the grid network then the subsequent electricity produced cannot be distributed and sold. However, in the long term as important as the physical connection is the price paid for and availability of access to the distribution system. Renewable generators are usually classified as distributed generators, selling electricity directly onto the distribution system – and thus avoiding the need for the high voltage transmission sector. As such the delivery costs for electricity from these distributed generators will be lower than conventional power sources. These and other economic advantages of renewable energy sources must be taken into consideration when setting the grid tariffs. The revised electricity market Directive, due to be transposed into national law in current and future Member States of the EU by July 2004 calls for[8]:

The terms, conditions and tariffs for connecting new producers of electricity to guarantee that these are objective, transparent and non-discriminatory, in

[8] Directive 2003/54/EC Of The European Parliament And Of The Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing Directive 96/92/EC, Article 23.1.F

particular taking full account of the costs and benefits of the various renewable energy sources technologies, distributed generation and combined heat and power.

The revised Directive also calls for Member States to allow distribution system operators to give priority to electricity from renewable energy sources (Article 14.4). However, in general experience in accession countries suggests that grid access for renewable energy generators is not even guaranteed – never mind given priority – nor non-discriminatory. The exception to this is in **Czech Republic** and **Slovakia** where distribution system operators are obliged by law to transport renewable electricity. In **Hungary** the Electricity Act requires renewable suppliers access to the grid if the capacity is above 0.1 M and if the technical requirements of the grid operator are met. In **Lithuania** the Transmission System Operator is required to give preferential treatment to renewably generated electricity.

In most accession countries the transmission system operator remains in state control, as do many large incumbent generators. This can create difficulties for grid access for independent power producers. In **Hungary** it is expected that renewable electricity producers will in the future have to conform to a specific Grid Accession Plan, thus increasing the technical requirements for access. In **Czech Republic**, **Estonia, Poland** and **Slovenia** independent renewable generators are responsible for the costs of extending and/or strengthening the grid for new connections.

9. Administrative Procedures

Most renewables electricity facilities tend to be far smaller than conventional power plants. However, in many countries the planning regulations and requirements on the applicant are enforced regardless of type or size of facility. In some cases RES are subject to greater planning and administrative processes than other larger or similar conventional generators. The revised electricity market Directive tries to address this imbalance by calling for *'Member States shall ensure that authorisation procedures for small and/or distributed generation take into account their limited size and potential impact.'* Similarly, the Renewables Directive calls for '*streamlining and expediting procedures at the appropriate administrative level'*. The implementations of such rulings are needed in most accession countries.

For example in **Hungary** up to 28 separate procedures are needed to authorise the operation of renewable energy production facilities, in **Slovenia** approval of about 15 separate authorities is required. Other problems seen across the region is the lack of national guidelines for the authorisation procedures, as occurs in **Poland**. The lack of unified processes makes it more difficult to renewable power producers to reduce the risks associated with their investments.

Overall, there is a need to increase the knowledge of regulators about the specific characteristics of renewable energies and how to support their development. Action aimed at raising awareness, sharing information and supporting policy makers and regulators in this area –such as the REEEP-backed Regulators Network– should be implemented without delay.

10. Power Disclosure

The revised electricity market Directive calls for electricity retailers to provide information to the final customers of the contribution of the various energy sources in the fuel mix over the proceeding year along with information on their environmental impact, particularly Co2 emissions and nuclear waste produced, resulting from this electricity production. As competition between suppliers is gradually increased across the enlarged EU, with a requirement for full market opening – allowing domestic consumers to choose their supplier – by July 2007, it is fundamental that consumers are given more information about the mechanisms and impact of electricity production.

The 2002 Eurobarometer Energy Survey (Eurobarometer 2002) found that 88% of respondents in the EU felt that global warming and climate change are a serious issue and 47% of respondents would like to be consulted on the choice of energy sources for the future. More recently, a EU-financed survey for consumers and small and medium businesses, including in Hungary, has found public support for full electricity disclosure information, i.e. on the fuel mix and environmental impacts. The survey found that this information should be sent out with the electricity bills, rather than via a website, which only 50% of the target group could easily access (SEI 2003)[9].

The requirements for disclosure are a fundamental tool in allowing consumers to make an informed choice on their electricity suppliers. Currently, only a few Member States, e.g. Austria and the Netherlands, require consumers to be given this information and to date no accession countries have implemented this requirement. However, with the adoption of the revised electricity market Directive, the obligation on power companies to supply information on the fuel mix to all final consumers by July 2004 will have to be applied by all Members of the Enlarged Europe.

[9] Stockholm Environment Institute et al (2003), Consumer Attitude to Electricity Disclosure in Europe, Report prepared as part of the ALTENER project "Consumer Choice and Carbon Consciousness for Electricity (4CE)".

11. Policy Recommendations

In order to meet the targets of the RES Directive and to support the rapid introduction of renewable energy, Governments in accession country must urgently put the following measures in place:

- Renewable policies: when implementing the Renewables Directive, accession countries should elaborate a separate legislation dedicated only to renewable energy development.

- Binding Targets: The RES Directive proposes only indicative targets for the use of renewables in 2010. To ensure a stable investment framework new legally binding targets need to be put in place for 2015 and 2020, with a view to setting a EU-25 goal of 25% of renewables energy share of primary energy by 2020. Binding targets also need to be urgently introduced for heat generated by renewables sources.

- Support Schemes: Most accession countries have deployed feed in tariffs to support the further development of renewable generators. However, it is as important to have the correct feed-in tariffs as its establishment itself. First and foremost the correct price to cover costs must be establish and also medium term guarantees for prices must be imposed, giving 10-15 year price guarantees for new renewables. Where quota systems are applied, such as in Poland, they must be accompanied by a working green certificate market and an effective penalty system. Quota systems must also have progressively increasing requirements with long-term objectives.

- Grid Access: The revised electricity liberalisation Directive enables distribution system operators to give priority to renewable generators when dispatching electricity. This should be mandatory in all national laws. Furthermore the cost of grid use should take into consideration the economic advantages – lack of use of high voltage transmission – of embedded generation.

- Administrative Procedures: In most accession countries the administrative procedures for the deployment of renewables are complicated and a disincentive for investors. In general all administrative procedures must be streamlined but for RES specific procedures must comply with the requirements of the RES Directive and guidelines should be developed on a national level to reduce local or regional planning differences and to ensure environmental protection.

- Disclosure of Electricity Sources: By July 2004 all current and new Member States of the EU must ensure that electricity suppliers provide final customers with details of the mix of sources used and their environmental impact. It is clear that in all accession countries urgent efforts must be taken on the policy and industrial level to enable this requirement to be met.

- Review of Policies: A review of the support schemes and other aspects of the RES Directive should be undertaken by October 2004 and published by the European Commission.

- Energy Efficiency: Accession countries have lower energy efficiency levels that the EU average. Transformation of the household sector is expected to increase electricity and energy demand. To counter this predicted increase, to improve the economic efficiency of the industrial sector and to help countries met their targets for the RES Directive, a rapid programme of energy efficiency must be implemented. This must be treated as a priority across all sectors.

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1. Summary

The Czech Republic is far behind current EU member states in the development of renewable energy technologies. The lack of legal support mechanisms is the fundamental reason why only a small fraction of the Czech Republic's renewable potential is utilised. Investment and tax incentives may only promote the installation of a limited number of demonstration projects. Long-term guaranteed production support is needed to ensure genuine renewable development and that the Czech Republic meets the 8% target for 2010 established in the EU Accession Treaty. The key policy recommendations include:

- The support mechanism should be sound and guarantee long-term production revenues from electricity production in a way that ensures reasonable pay-back time and profit. This is a crucial condition for getting the banking sector interested in providing loans for renewable energy projects. Without external capital, only a limited number of projects would be developed;
- The support mechanism should be grounded in law; only this gives sufficient assurance that conditions will not change often and rapidly;
- The 8% target needs to be established as an obligatory target; respective annual targets need to be included in the law and raised linearly from year to year; it should also express the desire continue the progressive trend beyond 2010;
- Administrative procedures need to be simplified in order to attract more applicants for operating renewable energy technologies, though nature protection criteria for these projects should be kept high;
- A mechanism for supporting heat production from renewable energy sources needs to be established; given the potential of renewable energy sources in the Czech Republic, heat production from biomass has far the greatest potential and would significantly contribute to the development of rural areas and agriculture enterprises.

2. Targets

So far, only a fraction of renewable energy potential is utilised in the Czech Republic. At present, more than 98% of renewable electricity comes from large and small hydroelectric power plants. Installed capacity of wind generators is no more than 10 MW and the share of other renewable technologies is negligible. The annual electricity yield of renewables greatly depends on precipitation levels for a given year. In 2001, large hydroelectric power plants (i.e. with an installed capacity of more than 10 MWe) produced 1,165 GWh and small hydroelectric plants 826 GWh

Table 1. Renewable electricity production (2001 - 2010, GWh)

Technology	Production in 2001, in GWh	Estimated production in 2010, in GWh
Wind energy	0.6	930
Small hydro stations (up to 10 MW)	826	1,120
Large hydro stations	1,165	1,165
Biomass combustion	5.9	2,200
Geothermal energy	0	15
Photovoltaics	0	15
TOTAL	1,998	5,445

Source: Explanatory comments to the Renewables Act Proposal, calculations by Enviros.
Note: Gross domestic electricity consumption in the Czech Republic in 2002 was 65.0 TWh. The main energy sources are coal (68% of the total production) and nuclear (25%). The Czech Republic is a net electricity exporter with a trade surplus of about 12 TWh annually.

of electricity[i]. The average percentage share of renewable energy sources on gross domestic electricity consumption fluctuates around 3.5% (with about 2% contributed by large hydroelectric plants).

As expressed in the EU Accession Treaty, the Czech Republic is obliged to meet the target of 8% renewables in its gross electricity consumption in 2010[ii]. This target is also being adopted in other energy- and environment-related policies and documents (though other targets were previously established they were all lower than the one cited above). This target can be considered quite ambitious. Unfortunately, the statement that "the possibility of reaching this target highly depends on climatic conditions" greatly weakens the obligatory nature of the target. The estimated break-down of technologies that would likely compose the 8% share of renewable energy sources in 2010 is provided in the following table. The greatest potential is in biomass combustion and wind, but also in the increased capacity of small hydroelectric stations.

No targets for later years beyond 2010 have been set up yet. Targets for 2020 and 2030 should be included in the State Energy Policy, which the Czech government will decide upon in January 2004. Two proposals are currently being prepared. One is by the Ministry of Industry and Trade, which heavily relies on domestic lignite and two new nuclear reactors to be built after 2015. An alternate proposal is being prepared by Ministry of Environment, which is based on increased energy efficiency, mainly through ecological tax reform, and on renewable energy sources (with shares of 15.4% in 2020 and 19.5% in 2030 of gross domestic electricity consumption[iv]). Hnuti DUHA / Friends of the Earth CZ would advise that these targets be made compulsory in future negotiations. The proposed development of renewable technologies would bring an estimated additional 59,000 jobs to the sector by 2030 (with a total of 78,000 positions); the renewables sector would employ more than 71% of the employees in the entire energy production sector.[v]

3. Definition of renewables

Renewables under the support mechanism are currently defined in the Energy Act[vi] as: small hydroelectric plants with an installed capacity up to 10 MWe, solar energy, wind energy, geothermal energy, biomass and biogas. Large hydroelectric plants are included in the calculation of the renewable electricity targets but excluded from any support mechanism. The definition in the proposed Renewables Act is more or less the same, explicitly pointing out that in case of municipal and industrial waste only separated biodegradable waste can be used as a fuel in electricity production under the support mechanism. Landfill gases are not included. Biomass will be further specified in an ordinance to be issued by Ministry of Environment, which in its proposal once again excluded mixed waste incineration from legal support. Unfortunately, in the government proposal the co-firing of biomass in coal power plants is included in the support mechanism, which is a major problem in the definitions section of the proposed act. The ordinance also excludes plantations of invasive species, the energy utilisation of protected species, paper incineration (which can be recycled) and peat.

The definition of renewable energy sources is in compliance with the general recommendations of EU Renewables Directive 2001/77/EC in cases appropriate to the Czech Republic (thus the Czech Act does not mention tidal and wave energy). Moreover, it further excludes landfill gases and incineration of mixed municipal and industrial waste both from support and from the sources eligible to meet the 8% target.

4. Support mechanism

Tax and investment incentives

Since 1992, a five year income tax relief on renewable energy sources has been in place (the same arrangement as in Slovakia). Before 1 January 2004 a lower VAT was also applied for renewable technologies. Unfortunately, due to accession conditions of the EU (which is otherwise the main driving force for the renewables promotion), the VAT has increased from 5% to 22%.

Some investment support is provided by the State Environmental Fund. The support programme is grant based, with

no mandatory obligation for the Fund to financially support all installations. Mostly demonstration projects and household installations (solar, geothermal or wind) receive a subsidy. The maximum amount of financial support depends on the applicant's status (individual/NGO or municipality/enterprise) and the nature of the project, and varies from 30% to 80% of investment costs. While non-profit entities and households can receive subsidies, for-profit enterprises can usually receive low interest loans. Though this mechanism is beneficial in some cases, it cannot lead to the significant, widespread development of renewable technologies in the Czech Republic. This can be assured only by production support in which a certain amount of revenue from every produced kilowatt-hour is guaranteed for a set amount of years.

Table 2. Feed-in Tariffs (eurocents per kWh)

Technology / feed-in tariffs	2002 and 2003	2004
Wind energy, installations put into operation before 1 Jan 2004	9.4	9.4
Wind energy, installations put into operation after 1 Jan 2004	n/a	8.5
Small hydro (up to 10 Mwe installed capacity)	4.7	4.9
Biomass combustion	7.9	7.9
Biomass co-firing with fossil fuels	Not spec. i.e. 7.9	6.3
Biogas combustion, not into operation before 1 Jan 2004	7.9	7.9
Biogas combustion, not into operation after 1 Jan 2004	n/a	7.6
Geothermal energy for electricity production	9.4	9.4
Solar energy for electricity production	18.9	18.9

Source: Energy Regulatory Office, average exchange rate CZK/EUR 31.765 (Jan-Sep 2003, Czech National Bank)

Production support

Two support mechanisms are described below, the existing one in place since January 2002 and the one included in the proposed Renewables Act, which is supposed to be a transposition of the EU Renewables Directive 2001/77/EC into the Czech legal system.

a) The current scheme

In January 2002 feed-in tariffs were introduced for renewables. Though the tariffs are quite high (see table below) in the sense of allowing a pay-back time of less than 10 years, they are established by the Energy Regulatory Office only a year in advance. There is no guarantee or rule about what prices will be set for the following year. While the 2003 tariffs were kept the same as in 2002, the 2004 tariffs were significantly changed, largely for new wind installations put into operation after 1 January 2004. These tariffs were decreased by 10%. The tariffs for older installations were kept the same.[vii]

This scheme has only led to a few new renewables installations. Four windmills were erected in 2002 with an installed capacity of only 2.8 MW. Unfortunately, CEZ, the Czech electricity monopoly, has started co-firing biomass in their lignite power plants. This has increased the price of wood chips and other biomass as well as for other "pure" forms of renewable biomass, mostly municipal combustion units. This support mechanism will be in force until the new renewables act will be approved by the Czech parliament. The long-term guarantee of production revenues is undoubtedly a key condition for attracting capital for renewable projects and thus to their actual development.

b) The proposed Renewables Act

The act[viii] was prepared by an inter-ministerial group consisting of deputies from the Ministry of Industry and Trade, the Ministry of Environment, the Ministry of Agriculture and the Energy Regulatory Office. The act was approved by the government on 12 November 2003 and sent to the parliament. The law should be put into force by the accession deadline but it is already clear that the date will be missed. The first reading of the bill will start in the lower chamber of parliament during its plenary meeting starting on 9 February 2004.

The support scheme described below will undoubtedly be subject to change during the legislative process in parliament. The proposed scheme is unique, unprecedented in any another country. Though quite complicated, it can become a viable driver for a veritable renewables boom if certain conditions are met. The support mechanism can be described as a mix of quota system and feed-in tariffs. Its main features include:

- Supply utilities have to fulfil a certain quota of renewable electricity each year, up to 20% of quota can be transferred to the following year;

- The quota is established by monetary value (not energy units); the minimum prices of tradable green certificates shall be established and differentiated for different technologies;
- Both quotas and green certificate minimum prices are set up by the energy regulator;
- The prices of the certificates cannot decrease by more than 10% a year;
- The prices are guaranteed for 15 years and set in a way that the pay-back time is less than 15 years;
- There is no guarantee that anyone will buy green electricity from a producer; the market depends on how high the quotas are set.

To further complicate matters, there are three main exceptions to the scheme:

- Sources up to 0.2 MW of installed capacity can function under the feed-in tariff support scheme, then the distribution company may trade the certificates;
- All solar electricity can be sold in the feed-in tariffs scheme;
- The feed-in tariffs for other installations shall be in place until the full electricity market liberalisation on 1 January 2006.

Given its present formulation, the proposed scheme is very fragile and may not lead to actual renewables development. The act will hopefully be amended in parliament. Hnuti DUHA / Friends of the Earth Czech Republic main recommendations include:

- Compulsory targets for renewables production for every year up to 2010 have to be included in the law itself, and targets have to be set linearly from the 3.5% currently to 8% in 2010, starting at 3.8% in 2004 and increasing by 0.7% every year;
- A clear formula for establishing monetary quotas for supply utilities based on the yearly targets has to be included in the law, so that the energy regulator does not face political pressure every year for setting quotas;
- Clear conditions for green certificate prices have to be included in the law, with a maximum year-to-year decrease of no more than 2%; the prices should guarantee a pay-back time of less than 12 years and be guaranteed for at least 15 years;
- Sound penalties have to be introduced for those not meeting their legal obligation.

Besides other consequences, if adopted, the mechanism could lead to the real development of renewable energy in the Czech Republic. Some interest groups suggest the long-term guaranteed feed-in tariff as a better solution. This is generally true, but the main issue discussed in this regard is the scheme's compliance with the EU Liberalisation Directive 2003/54/EC, given its rule on unbundling distribution and trade, and the Czech energy and legal system. This issue has to be further explored. If possible in fully open market conditions in the Czech Republic, Hnuti DUHA / Friends of the Earth CZ would suggest the long-term feed-in tariff support scheme as a better solution.

5. Grid issues

Renewable electricity producers have guaranteed priority access to the closest grid (either on the level of distribution or transmission). The fluctuating nature of renewable electricity production should not be a reason for refusing this access. Grid strengthening and maintenance is paid by the grid operator, but on the other hand, the connection from the source side to the closest possible connecting point is fully financed by the renewable source operator. These costs are especially high for some remote wind facilities. These conditions have been maintained in the proposed renewables act as currently worded in the energy law. As a policy recommendation, the obligation of sharing the connection burden should also be paid by the grid operator. A fixed connection price per unit of installed capacity paid by the renewable source operator should be introduced (as it is, for example, in Austria).

6. Administrative procedures

Administrative procedures for developing renewable energy sources are rather discouraging. Some of the documents related to nature protection need to be declared both in the licence procedure at the energy regulator and the in the EIA process, if applied (for most renewables, EIA is facultative but it is usual practice for it to be required). Another major barrier is lack of EIA methodology in different fields. There is

no Czech noise standard; in addition, also the assessments of landscape impact are carried out differently for every installation. There is certainly room for improvement. The renewables act should follow the suggestion in Article 6 of the Renewables Directive and make administrative procedures as simple as possible.

7. Disclosure of power sources

Supply companies currently have no obligation to publish spectra of their electricity's original sources, neither as a company as whole nor for each of their customers. The proposed renewables act obliges that all supply companies need to inform their consumers of the percentage of renewable energy in the supplied amount of electricity. This needs to be done at least once a year. Unfortunately, they do not need to differentiate renewables by the type of technology (large hydroelectric plants are also included), nor do they have to inform the consumer of the respective proportions of non-renewable electricity.

The guarantee of origin issued by the Electricity Market Operator is a key condition to achieve the above goal. It is also an important tool for opening up the green electricity market. So far, only one utility has offered renewable electricity (mostly from small hydroelectric plants) but no real guarantee of its origin has been carried out beyond one's trust in the corporation's pronouncements.

8. Conclusions and policy recommendations

At present, the incentives to support renewable energy sources in the Czech Republic are insufficient. The introduction of feed-in tariffs is beneficial, but short-term guarantees do not provide the needed stability to the sector. As a result of missing legislation, only a fraction of the Czech Republic's renewable energy potential is utilised. The key condition for bring about a veritable renewables boom is the legal long-term guarantee of minimum revenues from electricity production. This can be assured either by introducing long-term guaranteed feed-in tariffs or by setting clear conditions to the currently proposed quota system with guaranteed minimum green certificate prices that are differentiated for different technologies.

Loans from the banking sector are only possible if the long-term guarantee of production revenues for the renewable technology operator is in place. And without external capital input, no development is possible. In addition to the renewable electricity production support mechanisms, it is also important to stress the importance of increasing energy efficiency and supporting heat production from renewable energy sources. It has been proposed that the latter will be included in the Czech renewables act. This could be the key factor that would bring about a revolution in biomass use and production in rural areas and in agricultural enterprises.

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iii Energy Regulatory Office, Annual Data Summary of Electric Power System of the Czech Republic 2002, http://www.eru.cz/zprava_2002/annual/index.html.

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www.ibmer.waw.pl/ecbrec

1. Summary

The main Estonian energy resources include oil shale, peat and wood fuels. The oil shale resource in already opened mines is sufficient to cover the present consumption level at least for the next 30 years. The use of oil shale creates a lot of environmental problems. Activities of the Estonian energy sector are based on the Energy Act. The target for RES-e share in the electricity consumption for Estonia in the 2001/77/EC directive has been set at 5.1% against 0.2% in 1999 (last reliable data). Wind energy along with biomass has the biggest potential for development in Estonia. The feed-in tariff measured against the prices of the major producer, Narva Power, (electricity produced by oil-shale combustion) was 0.76 EEK/kWh, i.e. 0.0486 EUR[8] in 2003 (no differences between capacities and different kinds of installations). The RES feed-in tariffs should amount to at least 1 EEK/kWh in order to be sufficient for the investors and to guarantee them a certain security. The IPP producers have (in principal, according to Electricity Market Act) free access to the network, however, grid access for independent power is rather limited in certain areas due to the shortage of grid capacity.

The main barrier to the RES development is lack of financial incentives for developers. Today's support schemes for RES do not ensure that investors get their investments paid back in less than ten years, which makes financing of the RES projects difficult. For wind power developers another obstacle is the shortage of the grid in most suitable areas for wind-projects – the western coast and islands, also these areas are mostly valuable natural sites as well as recreational sites, thus creating conflicts between different interests. For biomass CHP developers one obstacle is the small heat demand - there are not enough district-heating customers in small cities to make CHP feasible.

2. Renewables targets

The Long-term Development Plan for the Estonian Fuel and Energy Sector (1998) anticipated an increase in 2010 of the total share of renewables and peat in the primary energy supply by 2/3 against the year 1995. Thus the share of renewables and peat to 2010 was planned to be 13% of the primary energy. In 2001 the renewables made about 11% of the primary energy supply while the share of wood fuel still prevailed, 90% of the total production of firewood was used in households.[1]

The Estonian target (due to EU accession) for renewable electricity has been set up for year 2010 to be 5.1% against 0.2% (0.02 TWh) in 1997[2]. The requirements of the Directive 2001/77 are not yet provided in any legal act in Estonia. It can be expected that share of RES in total electricity consumption will reach 0.8% in 2003: at the moment 20 small hydropower stations (there are no large scale HPP >10MW) operate (0.4%), 5 wind turbines (2 MW-0.2%), 1 station fueled with black liquor (0.1%) and 1 landfill gas CHP. Further increase of RES in electricity production is expected by increasing use of biomass in CHP plants and wind energy[3]. Since December 2001 electricity has also been produced from landfill gas. Principally the system contributes to the achievement of the national targets, the Energy market Act obliges grid owners to purchase all electricity produced using RES, at a higher price than market price. But the set price subsidy is not sufficient to develop all potential RES projects.

- **Wind** - has the biggest potential in Estonia. Wind resources suitable for power production are available on approximately 20% of the territory. Several projects totaling 76 MW installed capacity are under preparation (Parki peninsula; Sorve

peninsula, Lake Peipsi, Virtsu penninusla, Rouste, Island of Ruhnu, Rohukula). The mid-term economic potential (to 2020) is estimated at 500 MW[4].

- **Biomass** - it is believed to be a source with good potential for utilization (the midterm potential is estimated at 248 MWe[4]). The area occupied by forest covers more than 50% of the country's area (2 million hectares of woodlands). As an additional resource, the area of ca 100 thousand ha covered with brushwood could be afforested and energy crops could be grown on 100-200 thousand hectares.

- **Hydro** – since Estonia is rather a flat country, it is exploiting only about 1-2% of its overall hydroelectric potential. Even though larger hydropower projects are not feasible, there are many locations where small-scale, environmentally friendly hydro projects exist or can be developed (the potential is 21,9 GWh/a[5]). Nowadays Estonia has no large scale hydro power plants (>10MW) and a number of small scale hydro power plants (1,9 MW and 8 GWh/a[5]). Estonia's hydropower technical potential is 30-80 MW.

- The conditions for utilisation of **geothermal and solar** energy in Estonia are unfavourable.

3. Definition of renewables

The Estonian Energy Market Act[6] stipulates the definition of renewable energy sources as water, wind, solar, wave, tidal and geothermal energy sources, landfill gas, sewage treatment plant gas, bio-gases and biomass. Biomass is the biodegradable fraction of products, waste and residues from agriculture (including vegetal and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste. The definition is in compliance with Directive 2001/77/EC.

4. Support mechanisms

According to Electricity Market Act[6] the network operator, which is a state-owned company Eesti Energia AS is obliged to buy the electricity produced from RES with a price which constitutes 1.8 multiplied by price equal to the weighted average price of electricity sold by the producer during the previous calendar year (this price is expected to increase in following years). This feed-in tariff is available for plants utilizing hydro power and biomass for 7 years, for other RES – 12 years, although not after 2015. The project developers do not complain about the length of time the feed-in tariff is provided. The prices are not differentiated among regions.

The feed-in tariffs are measured against the prices of major producer Narva Power (electricity produced by oil-shale combustion), revised annually by the Electricity market Inspectorate (in 2003 price was 0.76 EEK/kWh, i.e. 0.0486 EUR)[8]. The RES feed-in tariffs, in order to be sufficient for the investors and guarantee them certain a security, should amount to at least 1 EEK/kWh, as suggested in one of the interviews. Also subsidies for grid connections would facilitate dynamic development of RES in Estonia.

In the Estonian legal acts other incentives for the use of renewables also have been stipulated:

- The Value Added Tax Act (2001) where the sales tax incentives are laid down to electricity generated by wind power or hydropower – to the end of 2006 (0% VAT rate);
- Wood fuel and peat sold to individuals for heating – to June 30, 2005 (5% VAT rate),
- Pollution CO_2 charge is not imposed on enterprises using biofuel, peat and waste for energy production (c. 0.5 EUR/t CO_2 according to the Pollution Charge Act).

5. Access to the grid

National Grid, a subsidiary of a state-owned Eesti Energia, has responsibility for the power balance and real-time control of the grid. The prospective of extending an undersea power cable to Finland for delivery of cheap hydroelectric energy may not allow Estonia to realise investments on its own territory[7]. The Finnish Ministry of Trade and Industry has given permission

to lay an undersea power cable between Estonia and Finland, known as the EST link project. The undersea cable will be built as a 315 megawatt, direct current, high voltage connection that will permit transmission in both directions. Electricity transmission could start by 2004.

The energy transmission network belongs to state-owned Eesti Energi Ltd., the IPP producers have (in principal, according to Electricity Market Act) free access to the network, the fees for the power transmission must be transparent and the same for all power producers without exception. In practice there would be obstacles hindering free access (for example too high connection fees) and free competition, but there is the Estonian Competition Law, which must help overcome obstacles[9]. Grid access for independent power is rather limited in certain areas due to the shortage of grid capacity. The independent renewable operators are responsible for covering the costs of extensions and of strengthening the grid.

There is no full priority given for access to the grid. Independent renewable operators have guaranteed access unless shortage of grid capacity prevents access. There are waiting lists for booking grid access, if a developer fails to implement the project, the next one in the queue takes its place. The Electricity Market Act have made clear rules of grid access. Sometimes there have been refusals by some grid owners, claiming, that a developer should get access to the Transmission Grid, not to the Distribution Grid (which is of lower voltage), therefore a couple of projects have been delayed unless complaints are handled by the Electricity Market Inspectorate[8].

The data on the generator's electrical parameters shall be submitted in compliance with the document of the National Grid of Eesti Energia AS "Requirements for the connection of new generators". Additionally there has been a special standard elaborated for wind turbine generators: Company Standard EE EE 10421629 ST 7:2001 (EESTI ENERGIA AS) Technical Requirements for Connecting Wind Turbine Installations to the Power Network. The Standard has been approved and introduced by the Eesti Energia AS directive No 47 of 22 May 2001. The Standard has been entered in the Eesti Energia AS Registry of Normative Documents, Ref. No 30 of 22 May 2001. The Standard shall serve as a guidance for the connection of wind turbine generator systems and wind farms to the electrical network of Eesti Energia AS.

Upon the connection of wind turbines, the requirements for relay protection and automation shall be complied with, based on the following documents of Eesti Energia AS:

- Technical requirements for the connection of power plants to the Distribution Network of Eesti Energia AS;
- Requirements for the connection of new generators;
- Standard conditions of connection to the National Grid, use of network connection and provision of transmission, control and other services;

In addition, the Network Operator shall specify the following requirements for the connection:

- The need to upgrade the relay protection and automation of the electrical network in connection with the increase in short-circuit currents and (or) introduction of a feeding from several independent sources;
- Avoiding the feeding from the Wind Turbine Generating Systems (WTGS) of the part of the network that has been disconnected under an abnormal operation;
- Automatic reclosing, and automatic synchronisation of the WTG Systems;
- The need for automatic voltage regulation of the WTG Systems;
- Avoidance or mitigation of start-up shocks in the case of WTG Systems with asynchronous generators.

The application for connection of a WTG shall contain the following data: data about the applicant; desired installation-location; desired connection point; number of the WTG Systems; data on the tests of the WTG Systems (separately for each type); general data on the WTGS.

6. Administrative procedures

In Estonia the Planning Act regulates relations between the state, local governments and other persons upon drawing up plans. The purpose of the Act is to ensure conditions that take into consideration the needs and interests of as many members of society as possible for the shaping of sustainable and balanced spatial development, for spatial planning, land use and building. Environmental Impact

Assessment and Environmental Auditing Act provides the legal bases and the procedure for the conduct of assessments of likely environmental impact and environmental audits, in order to prevent environmental damage. In municipalities the development plans for energy sector, mainly for heat supply, are being gradually introduced as obligatory parts of general development plans and local comprehensive plans of municipalities. The local governments are responsible for granting planning permits. Some Counties have zonings developed, some municipalities have determined RES development areas at their Spatial Plans[8].

Activities of the Estonian energy sector are based on the Energy Act. According to the Act, the Energy Market Inspectorate regulates the activities of energy enterprises. The body carries out surveillance of fuel and energy markets, issues market licenses, checks and approves the prices of energy enterprises dominating on the market, etc. Technical Inspection of Energy Equipment is the responsibility of the Technical Inspectorate, includes licensing, registers, competition surveillance as well as consumer protection. There is neither energy agency nor any institution with similar functions in Estonia. The major governmental unit responsible for energy issues is the Energy Department of the Ministry of Economic Affairs and Communications (MEAC). The Energy Department includes two divisions: the Energy Conservation and Renewables Division and Division of Fuel and Energy Markets. There are two institutions dealing with energy issues subordinated to MoEAC: a) the Estonian Energy Market Inspectorate (EMI); and b) the Technical Inspectorate (TI). Electricity prices are regulated, all changes in pricing have to be approved by the Estonian Energy Market Inspectorate. All IPP producers can participate on the supply side, if certain conditions are fulfilled and the special production license is obtained from the Energy Market Inspectorate[9].

7. Disclosure of power sources

There are no legal procedures on disclosure of power sources as energy labels. Environmental Impact Assessment is mandatory and its statements publicly discussed.

8. Conclusions and policy recommendations

The main barriers to the RES development are lack of financial incentives for developers. Today's support schemes for RES-e do not ensure that investors get their investments paid back in less than ten years, which makes financing of the RES-e projects difficult. For wind power developers one more obstacle is the weakness of the grid in most suitable areas for wind-projects – the western coast and islands, also these areas are mostly valuable natural sites as well as recreational sites, thus creating conflicts between different interests. For biomass CHP developers one obstacle is the small heat demand - there are not enough District heating customers in small cities to make CHP feasible. The prospective of extending an undersea power cable to Finland for delivery of cheap hydroelectric energy may jeopardise the development of wind power in Estonia.

Assistance to the forestry and agricultural sectors to promote renewable energy utilisation can have major positive environmental effects. Estonia is an important industrial state, with a well-developed technological and skill base, this could offer important opportunities for renewable energy technology production. One of the major challenges in meeting the financial requirements for the implementation of RES policies is the fact that international financial institutions consider environmental projects for Estonia too small. The recommendations for Estonia in the area of RES-e development are:

- Establish higher feed-in tariffs for renewables;
- Increase foreign and local investments;
- Upgrade and strengthen the electricity grid so bigger RES-e projects in good sites, e.g. wind in coastal areas could be developed;
- Elaborate a development plan for biomass development;
- Enhance co-operation within the Baltic region.

9. Literature

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[3] Workshop on "Developments Regarding Use of Renewable Energy Sources (RES) in the Baltic States" 16-17 June, 2003, Sigulda, Latvia, URL: http://www.bef.lv/core_bef/pdf/reports/03_06_16.pdf

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[7] Renewable Energy and Energy Efficiency Partnership (REEEP) Estonia. 2003.

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Hungary

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1. Summary

Hungary has a significant renewables potential. Nevertheless, without a comprehensive and well- designed dedicated renewable energy policy, the country is unlikely to meet its 2010 targets. Although the new electricity act came into force January 1st 2003 and implemented the feed-in tariff system, this has failed to deliver a long term, predictable investment support framework for renewable energies. Differentiated, high-enough but decreasing feed-in tariffs for a longer term are urgently needed. A cost-benefit analysis should be carried out to decide which renewable source with the help of what particular type of support scheme (investment or production) can be improved most efficiently. In parallel with this the prevailing grid constraints (lack of capacity, negative attitude of the energy supply companies) have to be eliminated.

Furthermore, complicated and lengthy administrative procedures – which unnecessarily draw out the process of development – should be reviewed. Finally, decision-makers have to make a firmer and deeper commitment to education for sustainability, including awareness raising in relation to renewables. Without such measures, low public acceptance of renewables will slow the progress required to meet our targets on time. Public awareness can be increased by the implementation of the disclosure system in which Hungary is lagging far behind the EU-15 countries.

2. Renewables targets

In 2003, the share of renewables in the total primary energy supply was 3,6%. According to Government Resolutions 1107/1999 on the Strategy of Energy Conservation and Improving Energy Efficiency this share will be doubled to at least of 5% by 2010. The share of renewables in electricity generation is not significant, only 0,5% (2003). Although the first target from the EU was to reach 11,5% by 2010, during the accession negotiations it turned out that this goal is not realistic. Therefore the EU set the new 3,6% target for Hungary. This is the equivalent of approx. 1400 GWh, which will be covered by 186 GWh of hydropower, 700 GWh of biomass, 400 GWh of waste incineration, 50 GWh of sewage treatment, and a about 50 GWh produced wind energy.[1]

The high biomass potential is a result the EU's Common Agricultural Policy: after our accession 10 % of the arable land is expected to be removed from cultivation. According to the national oil company, Hungary can meet the biofuel share target for 2005-10. Geothermal energy also has a big potential (380 million m^3/year, or 63 PJ/year heat equivalent)[2] but legal inconsistencies hold back progress. The utilisation of geothermal energy falls under the Mining Act. The users of thermal water have to pay royalty, water reserve tax and sewage fine, and the water intake falls under the national water law. Utilisation of both solar and wind energy is low but the latter will increase from the current 3250 kW to 200-300 MW in a few years.[3]

The country's hydropower potential is not determinant due to the natural and geographical conditions (configurations of the terrain). 1060 MW is an economically and technically feasible potential output, equal to 4500 GWh annually. The existing large scale, hydro power plant total capacity is 37,5 MW, from which the annual exploitation is 20 MW. Small hydropower's total capacity is estimated to be 1,8 MW.[4]

[1] Bohóczky, Ferenc (2003): Tanulmány részlet a megújuló energiaforrások hasznosíthatóságáról, a gazdasági lehetőségekről (Manuscript), Budapest

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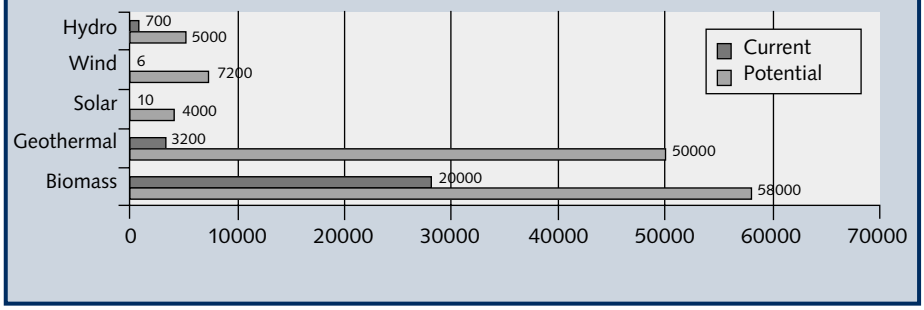
[3] According to experts of Ministry of Economy and Transport and local energy suppliers.

[4] Schmidt, József (1998): Magyarország vízerőművei. http://www.brody-ajka.sulinet.hu/_er/vlepcsok/vlepcsok.htm

Figure 1 Current utilisation of renewables and potentials for 2010



Source: www.gkm.hu

Table 1 Renewable energy utilisation in 2001[5]

Type of renewable energy sources	Electricity GWh	%	TJ	Thermal TJ
Hydro	186	94.62%	670	
Wind	0.92	0.07%	3.3	
Geothermal				3,600
Solar thermal				56
Photovoltaics	0.06	0.03%	0.22	
Wood				24,000
Other solid waste			3,000	
Landfill gas	2	1.02%	7.2	12
Sludge/sewage gas	7.6	3.87%	27.4	120
Heat pump				40
Biomass (vegetal waste)				4,870
Subtotal	196,58		708	35,698
Total (TJ)	~36,405			

3. Definition of renewables

In Hungary the legislative framework to define renewables is set out in the Act CX. of 2001 on Electricity (Definitions, #29). According to this, the following types of energy sources are considered renewable: geothermal, biomass, solar, wind and hydropower. While energy from waste is not defined explicitly as a renewable source of energy in the Act, it lumps power production from "renewable sources and waste" together for purposes of support, and states that "*in order to enforce environmental protection requirements and diversify energy sources, the use of renewable sources and waste for power yield must be promoted*".[6]

In its Transitional Provisions (#246) it further narrows the scope of support and states that "*support granted to promote renewable sources may not be used for supporting a) the generation of power from waste ... if it fails to meet the requirements of refuse collection and separation specified in a separate statutory regulation, or if power is not generated from biologically decomposing organic matters, and b) hydroelectric generating plants of a capacity exceeding 5 MW*". The definition of biomass can be found in the Ministerial Decree 56/2002, which regulates the feed-in tariff. According to this expression 'biomass' includes the biodegradable fraction of waste and sewage water, of agriculture, forestry food industry and of energy crops.

4. Support mechanism

A) Investment incentives

The legal background for the support of renewables is based on the Energy Savings Strategy and Action Plan, (1107/1999) with the objective to increase the consumption of renewable energy from 28 PJ/year to 50 PJ/year by 2010 and the previously described Electricity Act (CX/2001). The financial background of the renewable energy section (3.8 million Euros) was to be extended by 1.5-1.9 million Euros, if the environmental impact fee is implemented. The implementation of the fee in question will be realised only in January 1st 2004, but it seems that money generated from this source will not serve environmental aims. In May 2002 the new government converted the prevailing support system to the

[5] Bohóczky, Ferenc (2003): See above
[6] In this section we use the official English translation of the Act, and do not correct for language problems.

National Energy Efficiency Program with a total available amount of € 1.210.000 for renewables. Share of support cannot be more than 30% of the whole investment. Unfortunately, this fund ran out by August and the next call for proposals with a trimmed budget is expected to come only in March 2004.

Furthermore, this funding does seem to be cost-efficient. While decision makers have to take into account some measures like annual energy cost saving and annual energy saving, these criteria are not expressed in terms of a concrete value under which the project cannot be funded and there is no differentiation in terms of costs, geographical situation and technological development. The support scheme of the Ministry of Environment does not play a significant role: so far only one renewable related application has applied and it has not been approved yet. The VAT on biofuels is 0%, but form the 1st of January, 2004 the VAT on solar applications will belong to the highest level of VAT tariffs (25%) from the previous 12%. The Hungarian development bank, as well as the Energy Credit Fund, supplies soft loans for renewable projects.

B) Production incentives

The new Electricity Act came into force on January 1st 2003, implementing a Feed-in Tariff system (FITs). Although the main objective of the act is to create a comprehensive promotion system on the basis of a Green Certificate scheme, according to the act, the Government will define the start date of implementation sometime in the future. Until the date of implementation the FITs are operating. The Act stipulates that the obligation does not apply for facilities under 0.1 MW capacity. This limitation prevents many small power plants from gaining access to the grid.[7] The Ministerial Decree of 56/2002 defines the feed-in tariff. In 2003 it is 17.41 HUF/kWh (6.6 €cts/kWh) on average, which represents an important step towards the support of renewables, but according to the investors and experts, is not sufficient. There is no differentiation among the renewable sources, in contrast with the spirit of the act. The prevailing system and price support is favourable mainly for wind power, but other technologies are not compensated for this disadvantage.

The price, as stipulated in the decree, shall be adjusted for inflation every January. Although the validity of the decree expires only in 2010, as it falls within the competence of the Ministry of Economics and Transport, the Minister can change the prices as well as the period of guaranteed receipt any time without any process, as has happened in the past few years. This fact decreases the investors' trust again, since banks are not willing to provide loans for projects whose returns can not be safely calculated. However, if the price-regulation was based on an act, due to its stability, the cash flow of investments could be envisaged reliably. Contracts with the energy supplier-company have to be renewed yearly, but, if the supplier is a stakeholder, it is possible to make long-time contracts.

Fundamental problems seem to occur in connection with the biomass utilisation. While the German regulation gives clear conditions for biomass projects, (to get the feed in tariff the plant has to meet a minimum efficiency rate and has to be under 20 MW) in Hungary lack of limitation causes serious trouble in the field of micro-economy, nature conservation, infrastructure. Presently, the biggest biomass plant is 30 MW, without co-generation, with a low rate of efficacy. There are also some other 50 MW projects under development. The following conclusions can be drawn regarding the promotion of renewables:

- There is a need for long term investment support scheme taking into account the key findings of a comprehensive economic study on renewable potential;
- Stable financial sources for funding should be found (environmental impact fee and energy tax revenues should finance these objectives);
- Feed-in price ought to be increased to approx. 9 c€ / kWh on average, with some price differentiation;
- These prices have to be guaranteed in the electricity act and to every newcomer for at least 8 years, during which the price is gradually decreasing.

5. Access to the grid

Pursuant to the electricity act and the connected ministerial decree electricity suppliers are obliged to allow

[7] The reason of the limitation is, according to the authors of the decree, facilities under 0.1 MW capacity can jeopardise the security of the electricity system. Thus these should not gain access to the grid.

renewables accession to the grid, if the accessing application's capacity is above 0,1 MW and if it meets the technical requirement of the grid (published by the utility). Consequent requirements are not clear. For investors it is not transparent why they cannot access the grid anywhere they want. It seems that the legislation lacks some protection against the monopolistic approach of the regional distributors or put more accurately, against the owner of the local electricity networks.

According to utility companies, the security of supply requires the limitation of the number and capacity of renewables because electricity from them cannot be predicted and the grid can compensate just a certain amount of fluctuation or frequency change. Currently this acceptable amount is 300-350 MW only. In order to meet our targets regarding the proportion of renewable electricity generated it is unavoidable to develop the grid, however it is doubtful that on a liberalised market someone will build a base load plant. According to some sources the developers of renewable projects will be obliged to have a so-called Grid Accession Plan prepared from the next year. This study, which amounts to an additional investment cost, will identify the potential effects of the project on the grid and the whole system. In an optimal case these effects will be negligible, but, in contrast, if the new plant were to harm the system, the developers would be liable to cover those costs occurred in order to strengthen the local grid application.

These expenses could significantly increase the total investment cost, which implies a longer pay-back time. It is desirable to harmonise or to adjust the central grid development plans to the renewable targets. Currently renewable based plants under a rated power of 100 kW cannot take advantage of the feed-in tariff system, due to the resistance of the utility companies. As a result of this, in spite of the significant potential, small scale PV cells possess just a tiny market niche. On the other hand, the attitude of the Independent System Organiser and the local electricity suppliers towards renewables is quite negative newcomers been regarded as an unknown, uncertain problem. As yet the government has not made any progress towards examining what grid development is necessary and how much investment this would require. If it did, and allocated the money needed, the energy suppliers might accept renewables. Finally, it can take up to a year to get the permit needed for accession to the grid, a very long time with regards to the expiry of the price decree in 2010.

6. Administrative procedures

Quite a few problems can be identified regarding new renewable energy projects, some of which can be traced back low public awareness and the resulting low level of public acceptance. In contrast with Austria, Germany and some other countries, the co-operative model, which could make local people interested in renewables, has not appeared in Hungary. The installation of renewable energy power plants needs an environmental and a construction permit as well as the license of the Hungarian Energy Office (latter is needed if rated power is over 50MW). Environmental permission is given by the regional authorities, mostly environmental impact assessment is required (it is regulated in detail in the Ministerial Decree of 20/2001). The nature conversation authorities (being the expert throughout the process) often prove to be a constraint on renewable developments as –in their view– environmental protection and nature conversation have to be distinguished from each other. They are openly hostile to some renewable projects. Unfortunately this situation is made more difficult by the rather vague act on environmental evaluation.

The environmental permit is just one part, albeit a very important one, of the whole permitting process. Besides the environmental authorities, there are plenty of other players who can block the procedure. Some of these are self-evident, like the housing and construction authority, but another 20-30 organisations can be involved in the process. The main problem originates from the lack of transparent and coherent criteria that could be taken into consideration by the authority when making decisions. The lack of this means authorities very often cannot express their demands toward the investors and project developers. Nature conservation authorities complain that the requirements of the EIA law are insufficient, that they need more

specific information from the developers. The whole consent procedure can last up to 8 months, which very often results in a loss of the investors' interest. Perhaps training of the authorities' relevant experts and clear guidelines on the permission procedure would help the investors as well as the authorities.

7. Disclosure of power sources

As the legal base of the electricity disclosure initiative is the liberalised electricity market firstly we introduce the present state of liberalisation, followed by some highlights from the present situation of electricity disclosure in Hungary. The Hungarian electricity market was opened up to liberalisation from the 1st of January 2003 for the authorised customers (consuming at least of 6,5 GWh/annum) and scheduled to be opened for small-scale consumers from 2008. This means that at this stage of the liberalisation there is only a slight demand for electricity disclosure. Full liberalisation is due to happen by 2008. Though Hungary is going to be the member of the European Union, which applies electricity disclosure according to the regulations of the 2003/54/EC EU directive, only a few steps were taken towards the required institutional background. The first step towards institutionalisation was the modification of the electricity law (2001/CX). The definition of the green certificate was included and the relevant tasks and responsibilities were allocated to the proper institutions. The Hungarian Energy Office has the authority to name the sources of electricity that can be labelled as "green" in the green certificate.

The Government is responsible for determining the date of implementation of the green certificate system. The electricity law takes note of the market share of renewables and the former experience of European green certificate systems when determining the date. In general the Minister of Economy and Transport is responsible for elaborating the system of verifications, reporting, and data supply, and for the detailed regulation of the commerce and the green certificate. Up to this moment no steps were taken to implement the above-mentioned law. According to the Electricity Act, until the Government's further decision, the feed in tariff is in place, although the Act in 19 § defines the green certificate system. According to the Regulator, the existing support scheme (feed-in tariff) does not interfere with the disclosure or any of the tracking systems. The green certificate system is even more compatible, as certificates will probably be issued by the Independent System Organiser (MAVIR), as with the disclosure procedure.

To reach an effective function of both systems, there is a need for a centrally organised database, which will supervise the certification, quotas, sales, and exchange activities with an efficient tracking method. According to the experts from the Ministry, problems could arise if false data was created somewhere in the system. This could cause disturbance at crosschecks. Hungarian consumers are not really environmentally conscious but are quite sensitive to prices. While the cost of utilities in an EU country is 3-5 % of an average family budget, in Hungary it is up to 15-20% or even more. It is likely that the public utility sector will receive electricity from the Paks nuclear power plant because it is the cheapest option so the customer will probably not be willing to pay for the more expensive electricity from RES. The priority for large companies is also the price. A survey conducted by the IEF (Industrial Consumers' Forum) about the environmental concern of the large consumers, the result shows that they are interested in RES only if the price is not higher than from the conventional energy sources (Accenture 2000).

8. Conclusions and policy recommendations

Although it seems that the Hungarian government has made up its mind on renewables, the legal, technical, social and economic framework could, to put it mildly, be more favourable. In addition to the not too ambitious targets for 2010 and the implementation of a support scheme that has been seen to work very well abroad, in terms of the complex background that renewables need to

spread as fast as happened in Germany, Hungary is missing a comprehensive conception or strategy on renewables. Unfortunately the prevailing support system, in its present form, is far from perfect. Policymakers should implement the following policy recommendations:

- In order to co-ordinate the process leading to the solution of renewable related problems and to promote renewables' interests, an official governmental body should be established;
- A comprehensive support scheme consisting of both long term, predictable investment support and production support needs to be created. The latter should include differentiated, high-enough but decreasing feed-in tariffs over a longer term;
- There is a need to determine what steps (development, new base load plant) should be taken to make the grid capable of receiving the energy generated from the intermittent renewables. This needs consultancy and co-operation between the governmental body and local energy suppliers and the Independent System Organiser;
- One of the most important advantages of the renewables when compared with the fossil based energy production can be the positive attitude of the population. Information awareness campaigns and education programmes should be carried out to enhance communities' support for renewable energy projects.

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Latvia

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1. Summary

The EU Renewable Directive[1] stipulates the indicative target for Latvia in 2010 as 49.3% of renewable energy sources (RES) of gross electricity consumption. The necessary increase should be reached by use of more biomass in combined heat and power (CHP) plants (325 MWe to 2020[2]). The Energy Policy in the Electricity Sector[8] sets objective to foster promotion of use of renewable and domestic energy resources, which corresponds to approximately 6% of renewable electricity (the large hydro power plants excluded) in the balance of the total electricity consumption. In 2001 the Law on Energy was amended particularly with regard to the use of RES in Latvia. A number of Cabinet of Minster's regulations (CMR) were adopted in 2002 based on the above-mentioned law. The regulations on RES were changed from 1 January 2003, before the system was different and tariffs were defined in the Law referring to the average customers tariffs, now the price is much lower than before and sometimes must be approved by Regulator.

In Latvia priority treatments for electricity from cogeneration are integrated in the Energy Law and its amendments. There are administrative barriers for development of RES in Latvia. To start a project the investor must have a permit within a yearly quota of RES for electricity issued by the Ministry of Economy. Last years the quotas defined were very small (30 MW in 2002)[6] and even these were not used for different reasons (e.g. prohibitive conditions for grid connections, too restrictive quotas which exclude big projects). The system to get all the necessary agreements from authorities regarding the use of land, environmental requirements, connection to the grid etc., before applying for a permit from the ministry is rather complicated. The political will to support RES in Latvia has decreased in recent years- too restrictive quotas, decreasing feed-in tariffs. Legislation has been under constant change which does not guarantee stability for investors[6].

2. Renewables targets

The total installed generating capacity of electrical power plants in Latvia at the end of 2002 was 2,057.5 MW, including 1 538 MW (2796 GWh or 75 %) at the Daugava hydro power plants, as well as the hydro power facility on the Aiviekste river and the wind power farm in Ainazi, which use renewable resources[3].

Currently, the share of renewable energy (hydro) in the total energy production in the country is about 75%. This however is valid for only about 4 months per year, when conditions are all good for utilization of hydropower. For the rest of the year, Latvia imports electricity from Lithuania and Estonia in order to balance the electricity demand. In the year 2002 electricity balance shows that 6% of electricity is generated by independent power producers, mainly cogeneration plants producing 5% of domestic electricity generation and using natural gas and heavy oil as fuel (installed capacity not more than 12 MW), over 130 small hydro power plants with installed capacity less than 1MW, producing 0.8% and wind farms 0.25% (in total 14.7 MW and 36.9 GWh)[4]. Directive 2001/77/EC stipulates the indicative target for Latvia in 2010 as 49.3% of RES of gross electricity consumption (against 42.4% in 1999). The necessary increase should to be reached by use of more biomass in combined heat and power (CHP) plants.

The Energy Policy in the Electricity Sector[8] sets objective to foster promotion of use of renewable and domestic energy resources. The same document mentions that the Cabinet of Ministers will define specific volumes for the installation of capacities using renewable energy resources. By the year 2005, the increase of the average electricity sales tariff, due to the introduction of new renewable energy sources, should not exceed 5% that corresponds to approximately 6% of

renewable electricity (the large hydro power plants excluded) in the balance of the total electricity consumption. The document "Energy Policy in the Electricity Sector"[8] allows the Government to set annual quotas on the development of power capacity from renewables. As an example in the year 2002 the total volume for the installation of capacities was 30 MW if renewable energy resources are utilised for electric power generation. (Regulations on the total installation capacities in 2002 and specific capacities for each type of electricity generation if RES are utilised — CMR No 28).

Specific quotas of each type of electric power generation were as follow: small hydro-power (£2 MW) – 10 megawatts; wind power – 0 megawatts; energy acquired from biomass, forestry or peat, - 10 megawatts; energy acquired from municipal waste or their processed products (biogas), - 10 megawatts; solar, tidal, geothermal and geothermal energy – 0 megawatts. Out of these quotas 9.9 MW was used for hydro, 1.39 MW for biogas and 0 MW for biomass, forestry or peat. With respect to each type of renewable energy resource, the regulator, by 31 December annually, shall publish in the newspaper "Latvijas Vestnesis" the following information: applications submitted for the installation of new capacities during the respective year (in the chronological order); amount of installed capacities and the territorial location thereof during the respective year; surplus of the stipulated amount for the forthcoming year. The annual allowable quotas are too small to allow for a dynamic development of renewables in Latvia. Additionally such system can support established interest, which enjoy access to the policy arena.

Box 1: Renewable energy potentials in Latvia

Hydropower: Latvia has three major hydropower plants, and many more small-scale, local facilities. There is still unused potential for electricity production on the Daugava River. Already now besides three large scale hydropower plants on the Daugava River it is possible to start discussions about two large scale HPPs Jekabpils (30 MW) and Daugavpilis (100 MW)[4], there are about 150 small-scale hydro plants (<10MW) constructed. The economically justified potential is not more than 5-10 MW on small rivers and additionally 100MW on the Daugava River[5]. The technical potential for small hydropower in Latvia from renovation and totally new capacity is about 1 000 GWh.

Wind: Latvia has a very good potential for wind energy development alongside the Baltic Sea coastline, especially that a high voltage transmission line runs along the coastline[ii]. The total installed wind energy capacity in Latvia in 2002 was about 27,2 MW (12 GWh)[4]. A new project for 100 MW installed capacity close to Ventspils is under preparation. The total potential for energy production from wind in Estonia is 1000 GWh[4].

Biomass: The production from wood based fuels has a high share in the total primary energy supply in Latvia (28.6%), but it is used mainly for heating in households[4]. The main risks for the supply of wood based fuels are related to increasing export of wood products and potential construction of a pulp factory which would increase the price for this resource. Approximately 2.7 million hectares or 44%[4] of the total land area of Latvia is covered by forests. Wood can be used for electricity production in district heating. Straw available for energy production in Latvia is c. 0.57 million tonne[4]. Currently there is one installation for heat production. Straw has a small, local potential in Latvia, mainly for heat production. The presently obtained quantity of biogas in Latvia is approximately 1 776 million m^3 per year, potential production capacity 170 million m^3 per year. The major biogas volume in Latvia might be generated from agricultural waste (59 mln m^3/a)[4], sewage waters from food processing industry and from landfill gas. However, the decentralisation of agricultural production has largely reduced the potential basis for raw materials.

Geothermal: (geothermal no high enthalpy waters) and solar the potential is poor.

3. Definition of renewables

According to the Energy Law[7], RES are defined as energy resources (potential water, sun, wind energy, biomass and geothermal energy) the origination and renovation of which is determined by natural or anthropogenic processes and that can be applied for direct utilization or energy generation. In other regulations like "Energy Policy in the Electricity Sector"[8] peat is also regarded as a renewable energy source (currently peat is used for production of 346 GWh/a of electricity)[4]. The peat-land areas cover 10.7% of Latvia's territory and potential for energy

production from peat amounts to 2.0 TWh/y[4]. It is recommended that peat is excluded from the definition of renewable energy sources.

4. Support mechanisms

In 2001 the Law on Energy was amended particularly with regard to the use of RES in Latvia. A number of Cabinet of Minster regulations (CMR) were adopted in 2002 based on the above-mentioned law, one of which is "Requirements for co-generation stations and the procedure of setting the price for purchase of excess electricity" (CMR No 9). It sets a higher power purchase price if the domestic energy sources are utilised (this includes peat). The price of electricity surplus provided under Regulation No 9 is applied only in the case when the cogeneration plant supplies at least 75% of the thermal energy produced in the cogeneration cycle to a district heating system. If this is not the case then the electricity may be purchased on an agreed price. The new principles for the determination of the RER-E price where accepted by the Cabinet of Ministers, the details are presented in the table below. The change of prices is perceived to be disadvantageous- it is lower than before and sometimes must be approved by the regulator which does not guarantee stability for the investor and makes the process of investment planning very complicated.

Table 1. Feed-in Tariffs for renewable power sources

Small Hydro (up to 2MW)	
Operation started before 01.01.2003.	2x T_{av} for a period of 8 years afterwards approved by the Regulator 101,10 EUR/MWh
Operation started after 1.01.2003.	Average tariff 50,55 EUR/MWh
Wind Power (up to 2MW), Photovoltaic	
Licence issued before 01.06.2001.	2xTav for a period of 8 years 101,10 EUR/MWh
Licence issued after 01.06.2001.	Regulator approves the price
Waste to energy (Biogas)	
Capacity less than 7MW	Tav till 01.01.2008. 50,55 EUR/MWh
Wave, geothermal	Regulator approves the price
Combined heat and power (CHP)	
CHP based on fossil fuels	
Installed electricity capacity less than 0,5 MW	0,9 xTav ~45,49 EUR/MWh
Installed electricity capacity more than 0,5 MW and less than 4MW	0,75 xTav ~37,91 EUR/MWh
Installed electricity capacity more than 4MW	Regulator approves the price
CHP based on biomass or peat	
Installed electric capacity less than 0,5 MW	1,12% x Tav ~56,61 EUR/MWh
Installed electric capacity more than 0,5 MW and less than 4MW	0,95 1,12% x Tav~ 48,01 EUR/MWh
Installed electric capacity more than 4MW	Regulator approves the price

Article 33 of the Energy Law[7] says that when managing inter-system electricity flow, the electricity transmission or distribution system operator shall observe the economic ranking principle. That means that sources shall be ranked according to economically justified criteria (such as the offered energy price, continuity and stability of energy supply, renovation of system assets, energy transportation distance). In case of equal ranking of sources, a preference to use electricity transmission or distribution system is given to the electricity producers located on the territory of the country and that applies to renewable energy resources, waste or co-generation mode in the technologic process of electricity generation. When agreeing upon electricity purchase prices from the producer, principles of minimum costs and economic ranking shall be followed.

5. Access to the grid

Latvia's electricity system is a part of the Baltic States electric power network and in collaboration with Russian and Byelorussia electricity transmission networks is connected in the joint circle. A major part of electricity is produced by state owned Joint State Stock Company Latvenergo in hydroelectric power plants (HPPs) and

combined heat and power plants (CHPs), c. 6 % of electrical power is generated by independent electricity producers. Supply of domestically generated electricity depends on the through-flow of river Daugava. The shortfall of energy has had to be purchased from Estonia, Lithuania and Russia (in 1998 Latvia imported 6% of electricity demand, in 2002 - 37%)[9]. In Latvia priority treatments for electricity from cogeneration are integrated in the Energy Law and its amendments. Electricity transmission or distribution operator according to article 13 of "Requirements for co-generation stations and the procedure of setting the price for purchase of excess electricity" (CMR No 9, shall purchase all electricity generated in cogeneration plants of licensed enterprises – the price is regulated by the same regulation.

The Grid Code[10] was drafted to fulfill the requirements of the Energy Law regarding the allocation of rights and obligations between the power system participants. The procedures for electricity generators according to the Grid Code are as follows:

- For capacities less than 1 MW a permit from a Minister of Economy is needed,
- From capacities exceeding 1 MW a license from an Energy regulation Council is needed,
- The next step is to submit an application to connect to the Network service provider,
- The applicant generator receives technical regulations for establishment of connection,
- Then the connection agreement is signed between the generator and the provider,
- Then the design assignment must be submitted,
- The generator and the provider shall undertake construction upon reaching an agreement on the purchase of electrical equipment jointly by concluding a mutual agreement and allocating the financial and legal liability thereon,
- The generator submits the connection program to the provider,
- The generator shall receive permit for the connection and conclude the network service agreement for ancillary services,
- The generator shall conclude a power purchase agreement with Latvenergo.
- The potential investors face difficulties to conclude long-term power purchase agreements with Latvenergo. The utility reportedly imposes prohibitive requirements for grid connections[6].

6. Administrative procedures

In Latvia electricity supply is regulated. The State institutions are involved in procedures for RES-E investments: The Ministry of Economy responsible for policy and legislation and the Public Utilities Commission is a regulator in energy, telecommunications, post and railway sectors. Within energy sector it regulates electricity generation, transmission, distribution and supply, cogeneration. Regulator functions regarding distributed generation:

- Licensing of electricity producers with an installed capacity more than 1 MW;
- Supervising of conditions of the licence, specific quality and environmental protection requirements, technical specifications, standards;
- Working out the tariff setting methodology for CHP with installed capacity more than 4MW;
- Approval of electricity tariffs for CHP (> 4 MW);
- Acceptance of pricing principles for wind miles and electricity produced from biomass (wood, wood waste) and peat.

In the Regulation "The procedure of installation and dislocation of electricity production capacities if renewable resources are used for production of electricity" (Cabinet of Ministries Regulation No 29) environmental considerations are particularly accented. It is stated that electricity production from RES can be promoted within the whole territory of Latvia, except in areas having certain limits on the construction of hydropower plants and wind turbine generators due to environmental or nature protection considerations (e.g. designated nature, species or habitat protection areas, fish resource protection zones). In 2002, according to the Law on Rivers, a list of rivers in Latvia where construction of dams is prohibited was issued. Restrictions with respect to the location of hydro power plants and wind power plants on the territory of the country are stipulated by the Law on Environmental Protection, including the Law on Highly Protected Nature Territories, as well as the Law on Protection of Species and Biotopes.

The main existing legislation act regarding spatial planning is the Law on

Spatial Planning, accepted the 22nd of May 2002. The aim of the law is to promote sustainable and balanced development in the country by using an effective spatial planning system. There are no other legal acts directly regulating planning, indirectly related to planning are the following legal documents: Act on Municipal Governments, Building Act, and Building Regulations, Act on Environmental Impact Assessment, Protective Belts Act, Civil Law. Planning and building regulations are regulated in different acts. At the moment the Ministry of Regional Development and Local Governments has been awarded to be responsible for spatial planning in Latvia.

There are administrative barriers- to start a project, an investor must have a permit within a yearly quota of RES for electricity issued by ministry of Economy. In 2002 the quotas defined were very small and even these were not used for different reasons. The quota system discourages, especially foreign investors, in investing in RES-E technologies in Latvia- it refers especially to those investors who invested in project development but did not manage to get their license on time. An example could be a 100 MW wind farm, of which the preparatory phase costs the project developer some 50 000 USD. The system to get all the necessary agreements from authorities regarding the use of land, environmental requirements, connection to the grid etc. before applying for a permit from the ministry is rather complicated.

Box 2. Authorisation procedures for new renewable energy projects.

Ministry of Economy sets the amount in MW for every type of RER-E for every year. Taking into account the requirements embodied and the restrictions specified in other regulatory enactment, specific capacity volume for renewable energy resources shall be determined separately for following groups: hydroelectric power plants with capacity installed up to 2 MW; wind power plants; power plants that utilise biomass including wood and peat; power plants which utilise biogas; power plants, which convert the energy of the sun or sea tides and utilise geothermal energy.
Applicants shall tender applications for the installation of new capacities to the Ministry of Economics. The Ministry of Economics shall provide an answer to the applicant and inform the regulator thereof. The regulator shall register the applications of applicants for power plant construction according to their order of submission.
The Ministry of Economy selects the method of electricity pricing for each particular type of resource: tender, organised by Regulator, if there will be several bidders and conditions - for determining the competitive price and selecting the best technology for each particular volume of capacity; approval of price in accordance with the Regulator's methodology.

7. Disclosure of power sources

None

8. Conclusions and policy recommendations

The share of RES in the electricity balance in Latvia is high, due to large hydro power plants, but there is still potential to use more renewables. The main obstacle to development of RES-E in Latvia is the low level of electricity prices, mainly from the large hydro input and low prices for imported electricity (however the prices are expected to increase due to decommissioning of fossil find nuclear units in neighbouring countries and due to the UE standards compliance)[6]. In Latvia, as far as green energy is concerned there is a system which guarantees the RES-E producer access to the grid as well as higher feed-in tariffs, which guarantee stability for investors. In order for the system to function properly the following steps are suggested:

- Remove the quota system, which is discouraging for new investors,
- If the quota system is to be maintained the quotas for particular RES should be bigger- it is absolutely not understandable why for certain RES the quotas are 0 while the project development is ongoing (wind),
- Stipulate the feed-in tariffs exactly – current stipulation of prices by the Regulator does not guarantee stability for the investor,
- Stipulate the length of time the feed in-tariffs are guaranteed- at least 7-8 years,
- To elaborate clear rules for granting construction permits, currently

investors face difficulties in concluding power purchase agreements,

- To reduce procedure for permits, not overlapping existing procedure for construction works.
- Create incentives for using biomass for energy production in Latvia,
- Introduce energy taxation reflecting external costs in energy production of non RES
- Remove peat from the definition of RES.

9. References

[1] Directive 2001/77/EC

[2] Blackand Veatch. 2003.Strategic Assessment of the Potential for Renewable Energy in the EBRD Countries of Operation, Stage 1 URL: http://projects.bv.com/ebrd/pdf/EBRD%20RE%20Final%20Report.pdf

[3] http://www.latvenergo.lv/en/latvenergo/gp2002/Latvenergo-AnnualReport-www.pdf

[4] Baltic Environmental Forum. 2003. Renewable Energy Sources in Estonia, Latvia and Lithuania.

[5] Minutes from the workshop on "Developments Regarding Use of Renewable Energy Sources (RES) in the Baltic States", 16-17 June, 2003

[6] Krug, M. 2003. Latvia: Handbook of Renewable Energies in the European Union II.

[7] Energy Law of 10.05.2001 (L.V. 30 May, No. 83) http://www.gridcode.lv/en/03_energetika.html

[8] Energy Policy in the Electricity Sector Approved by Latvian Cabinet of Ministers at September 11th 2001 URL: http://www.gridcode.lv/en/10_jaunumi.html?id=12

[9] Dace Bite. 2003. *Support mechanisms to ensure the electricity purchase from the power plants used renewable and domestic energy resources Latvia*. TRECKIN meeting in Warsaw.

[10] Order of the Latvian Energy Regulation Council No. 88 dd. 30.05.2000. Latvian Energy Regulation Council Pursuant to Item 8 Article 28 of the Energy Law http://www.gridcode.lv/en/02_tikla_kodekss.html

Lithuania

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1. Summary

Total power installed capacity (nuclear and non-nuclear) exceeds the present domestic consumption by almost three times. Therefore Lithuania exports a lot of electricity. The largest power plant in Lithuania Nuclear Power Plant (NPP), which in 2001 generated 11.36 TWh, corresponding to 77% of the total electricity generation (around 15 TWh). The Lithuanian energy (especially electricity) market is expected to go through great changes in the coming years. It has been decided (according to Lithuanian National Energy Strategy) to close down Unit 1 of Ignalina NPP by the end of 2004 and Unit 2 in the year 2009. The Directive 2001/77/EC sets the indicative target for RES at 7% of the total electricity consumption[1]. It is expected that targets shall be reached by focusing more on wind, biomass and hydro resources. The utilization of renewable energy sources has been stipulated as a priority in many policy documents. Electricity produced in RES installations is granted grid priority and higher feed-in tariffs. Generally RES installations producing electricity in Lithuania are given preferential prices, however, for some RES the prices is defined by a separate decision. The price are guaranteed for 10 years[6] of plant's operation. The suppliers are obliged to buy electricity produced from renewable and waste energy sources by generators connected to the transmission network and sell it to their customers.

2. Renewables targets

Promotion of renewable energy sources has been set as a priority both in the National Development Plan. National Energy Strategy[3] of Lithuania has been established to seek for reaching a strategic goal of the national energy sector aiming at 12% share of RES in the total primary energy balance and also not less than 35% of electricity should be produced in combined heat and power plants in 2010. According to the National Energy Efficiency Program[4], the local and renewable energy resources could replace about 12–14% of currently consumed primary energy resources[4]. Directive 2001/77/EC the share of RES shall increase to 7% of the total electricity consumption (in comparison to 3,3% in 1999)[5]. It is expected that targets shall be reached by focusing more on wind, biomass and hydro resources.

- **Wood**. 31% of Lithuania's territory is covered by wood, it is estimated that some 1 million m^3 of forest residues are not utilized. Wood is used mainly for domestic heating and it contributes to some 8% of the total primary energy supply. In Lithuania there are some 30 000 ha which are not used for agricultural purposes and which can be designated for energy crops, 500 thousand tones of biomass can be harvested annually[6]. Currently, the consumption of local and renewable energy resources makes up 7.79 TWh/a (excluding local oil). The utilized waste energy amounts to 0.93 TWh/a. The major part, i.e. 6.9 TWh/a, falls on the fire-wood that covers up to 8.3% of the national fuel balance. The consumption of this fuel has increased since the beginning of the implementation of the National Energy Efficiency Program. The possible energy production based on fire-wood makes up about 9.8 TWh/a[6].
- **Straw**. Straw available for energy production in Lithuania is 0,45 (1.5 TWh/a)[6] million tones per year. There are 7 boiler houses which utilize it for heat production (in total 4,5 MW). Lithuania has the highest potential for heat production from straw among Baltic states, some 62% of its territory is dedicated to agricultural purposes.
- **Wind energy**. The potential for wind energy production in Lithuania is some 200 -600 GWh/y[4,6] mainly in the coastline area (the largest potential of the wind power is in the West and North Lithuania,

particularly in the zone of the Baltic seashore) Currently there are no WTGs in Lithuania, one pilot plant of 52 MW is in the preparation phase.

- **Hydro**. According to Lithuanian Hydropower Association the economically exploitable potential for small hydro power plants is 185 GWh/a[6]. Currently there is one large scale HPP on the Nemuns river of 100 MW and 375 GWh/a and 41 small scale HPP of total capacity 15 MW and 41 GWh/a. Technical hydro energy potential is assessed to be 2.7 TWh/aThe realistic potential of rebuilding small derelict HPPs and installing new ones near the existing dams is about 131 small HPPs of 16 MW of the total capacity (0.5 TWh/a)
- **Biogas**. There is one landfill gas CHP and one agricultural biogas plant. In the future production of energy from biogas can be important locally.
- **Geothermal.** Hot Dry Rocks with temperatures exceeding 100°C in West Lithuania; where, theoretically the electricity-producing plants could be[7].

3. Definition of renewables

According to the definition provided in the Law on Energy and Procedure for the promotion of purchasing of electricity generated from renewable and waste energy sources[8,10] renewable energy resources mean natural resources: hydro energy, solar energy, wind energy, biomass energy and energy which flows out from the center to the surface of the earth (geothermal energy). According to the definition provided in the Law on Biofuels[9] biomass means renewable resources of organic matter, including agricultural products and residues, wood and wood waste, animal manure, municipal solid waste and others, whereas biofuel means flammable gaseous, liquid and solid products converted from biomass: dehydrated and denatured ethyl alcohol, methyl and ethyl esters of oil of biological origin, forestry residues and wood waste, straw, peat, agricultural residues, plants, biogas and other fuel of biological origin used to produce energy, biogas means gas of biological origin produced or converted from biomass or waste.

4. Support mechanisms

Public and independent suppliers of electricity, as well as for eligible customers engaged in electricity import are obliged to purchase and sell electricity produced from renewable and waste energy resources; electricity generated in the combined heat and power operation mode in the CHP plants when such plants supply heat to city district heat utilities[10]. Government issued Decree No. 1474[10] stipulates: The purchasing of electricity generated from renewable and waste energy sources by electric installations with an installed total capacity of all generators below 20 MW shall be promoted, Electricity generated from renewable and waste energy sources shall be purchased at long-term rates differentiated in relation to the type of renewable and waste energy sources being used, as set by the State Control Commission for Prices and Energy.

Law on Electricity[22] defines purchase procedure of electricity from renewable energy sources. Higher average purchase prices for electricity from RES and waste energy sources comparing to conventional fuels have been established. Article 33 of this law

Table: Feed-in Tariffs (EUR/KWh)

No.	Name	EUR/kWh[1]	Price, LTLc/kWh
1.	Hydro Power Plants	0,069	20
2.	Wind Power Plants	0,075	22
3.	Power Plants, using biomass	0,069	20
4.	Operating Power Plants, which supply electricity to 0,4 kV voltage network for 10 years period, when the date is counted since the connection to electricity network		Price fixed in Power Purchase-Sale Agreement on 31/12/2001
5.	Other Power Plants, using renewable or waste energy resources		Price is set by separate NCC decision

Note: The average renewable or waste energy prices could be differentiated.

[1] LTC/EUR: 3,452800

stipulates that the purchasing price for electricity produced from local fuel, renewable energy sources or waste, which are approved by the State Control Commission for Prices and Energy[8].

The current purchase prices for renewable electricity are as described in the table page 2.[11]

Generally, RES installations producing electricity in Lithuania are given preferential prices, however, for some RES the prices is defined by a separate decision. The tariffs are guaranteed for 10 years[6] of plant's operation. It is recommended to:

- Differentiate between small and large hydro power plants and give less support to large HPP;
- Differentiate feed-in tariffs between existing and new build projects;
- The feed-in tariffs should be based on normal accounting practices using the profitability index method and incorporating the external costs of conventional generation[19].

5. Access to the grid

According to the Decree No. 1474[10] the grid operator must ensure the transportation of electricity generated from renewable and waste energy sources primarily via electricity transmission grids (where the transmission capacity is limited). Order No. 380 of the Minister of Economy[xi] obliges suppliers to buy electricity produced from renewable and waste energy sources by generators connected to the transmission network and sell it to their customers. This requirement also applies to eligible customers that import electricity. The following terms shall be applied for the purchase of electricity the Transmission System Operator shall ensure preferential transportation of electricity produced from renewable and waste energy sources through the transmission network (if the transmission capacity is limited).

Where the electricity price is uniform, the market operator must give priority to the producers using local, renewable or waste energy resources. The conditions and procedures for connection to the Grid are stipulated in the Grid Code[13]. Operators of small generation sources (up to 5MW) shall obtain technical conditions for their connection to the grid from the appropriate Distribution Network Operator. Connection of a small generation source to the grid shall be possible only upon implementation of these technical conditions and permit of the Network Operator. The Distribution Network Operators shall collect and operators of small generation sources shall provide information regarding output to the grid from small generation sources connected to the distribution network on the dates specified in bilateral agreement.

6. Administrative procedures

The procedures of obtaining a building permit are regulated by the Law on Construction[14], which lays down general provisions for building research, design, construction, demolition, repair, and permits for the construction and operation of buildings and other structures. This Law is relevant to RES as regards of plants and boilers construction. The Law specifies the relationship between all actors of the construction process, their rights and obligations, as well as areas of State regulation and supervision. The municipalities are responsible for territorial planning and development and have the right, each for their own territory, to develop comprehensive and detailed territorial plans which must be in accordance with state interests[15]. A construction permit shall be issued: 1) by the county governor's administration - for a construction works in the territory administrated by several municipalities, for a construction works a builder (client) of which is a municipality; 2) by the municipal mayor (municipal administrator or another employee of the municipal administration authorised by him).

Within the coastal strip the exclusive right to issue a permit for construction or reconstruction belongs to the Lithuanian government mediated by the Klaïpeda County (since the entire coastal zone falls within the administrative boundaries of this county) and the Ministry of Environment. Proposals are usually

made by different municipality administrations. The Ministry of the Environment is the main responsible body for the marine affairs. Any legal and natural persons planning to undertake economic activities carry out an environmental impact assessment at their own expenses, prepare all documentation on the possible effects of such activities on the environment and submit it for approval in accordance with the list approved by the Government of the Republic of Lithuania which attributes the various types of planned activities to the competence of local authorities or the Ministry of Environmental Protection[16].

The Law on Environmental Impact Assessment[17] specifies the list of the types of proposed economic activities that are subject to screening for obligatory environmental impact assessment:

- Thermal power stations and other combustion installations, including industrial installations for producing, electricity, heat, steam or hot water (with an output of less than 300 MW, but more than 20 MW);
- Projects for the use of uncultivated land for intensive agricultural purposes (with an area of more than (0,5 ha);
- Installations for hydroelectric energy production or installations that use the hydroelectric energy (hydroelectric, power stations, mills, sawmills) (with a maximum power of more than 0,1 MW);
- Installations for the harnessing of wind power for energy production (wind farms) with a height of more than 10 m, (including vane length) or having 2 or more turbines;
- Construction of overhead electrical power lines (with a voltage of less than 110 kV and a length of less than 15 km but more than 3 km).

Construction of dams or other hydro-technological facilities is possible only with the permission of the institution authorised to issue such permits by the Ministry for Environmental Protection[18]. According to the information obtained in the interview national spatial plans for hydropower and wind energy developments should be prepared in coming year[19].

The National Control Commission for Prices and Energy[20] is responsible for: approving the purchase price for electricity generated by using renewable energy resources; approving the connection fees for electricity (grids, systems, and facilities). Economic entities that have an intention to engage in the generation of electricity from renewable and waste energy sources must obtain an authorization for this type of activity[10,21]. The principles of accounting of the purchased electricity generated from renewable and waste energy sources as well as the transparency of accounting shall comply with the requirements of Article 26 and 27 of the Law on Electricity and other regulatory enactments of the Republic of Lithuania[10]. It is recommended that a one-stop place is assigned as the place where investors can undergo all necessary administrative procedures.

7. Disclosure of power sources

According to the Article 11 of the Law on Electricity the State shall encourage customers to purchase electricity produced from local, renewable and waste energy resources, but there are no procedures on electricity disclosure so far[22].

8. Conclusions and policy recommendations

It is recommended that for better promotion of RES in Lithuania following measures are undertaken:

- Elaborate a legal document where all issues regarding RES investments is elaborated, recommendable Renewable Energy Act;
- Differentiate between small and large hydro power plants and give less support to large HPP;
- Differentiate feed-in tariffs between existing and new build projects, between large and small hydro;
- Create a one-stop place is assigned as the place where investors can undergo all necessary administrative procedures;
- Plan a more rapid development of RES after the old nuclear power plant has been decommissioned.

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Poland

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1. Summary

Poland has adopted the national renewable energy strategy and is harmonising its environmental and energy policy with those of the EU. Although targets set for the development of Renewable Energy Sources (RES) are ambitious, Poland is not on the way to meet them, as the introduced support mechanism doesn't prove to be effective. There is a need to introduce one legal act devoted to the renewable energy sector which would: strengthen the existing Quota Obligation System by defining penalties and by introducing Green Certificates System; create RES targeted fund; introduce planning of RES development on national and regional level. The current proposal of Renewable Energy Act does not provide a required support for renewable energy development. Other necessary steps for development of green electricity include: regulations concerning connection to the grid should be changed, so that they don't discourage RES investors, good practices and guidelines for RES investors should be disseminated, local and regional spatial plans should include land reservation for renewable energy sources installations.

2. Targets

Coal-fired power and CHP plants dominate electricity generation in Poland- in 2001 the share of coal in electricity generation was 96.26 % The share of renewable electricity in 2002 was 2.61%[1]. At the moment large hydro makes the biggest contribution in green electricity production, accounting for 53.5%, next is small hydro- 24% and biomass- 17%, biogas- 5%, wind- 0.5%. If one excludes big hydro from the share, small hydro would account for 51.5%, biomass for 36.5%, wind 1%, biogas 11%[2]. The total RES installed capacity in 2001 was 939 MWe: biogas 54 MW, biomass 330 MW, large hydro 345 MW, small hydro 182 MW, wind 28 MW (in 2003 it is 58 MW). Green power production accounted for 2 619 GWh[2]. According to the Safire model[3] projections the production of RES electricity in Poland in 2010 will be as follow: biomass will make the greatest contribution: wood 46%, straw 9% and will be followed by wind: 29%, large hydro: 8%, small hydro: 4% and biogas: 4%.

The strategic targets for renewable energy were set in the Development Strategy of Renewable Energy Sector for 7.5 % by 2010 and 14% by 2020 for renewable energy in the primary energy balance. In the Accession Treaty[4] the required target level of the RES electricity share in the total gross electricity consumption amounts to 7.5% by 2010. Although the national regulation-Energy Law requires also 7.5% green energy by 2010, the national target is actually smaller, as it refers to electricity turnover in distribution companies and not to gross electricity consumption as in the directive. The difference is aprox. 38 TWh, which means that the national target is lower by 30%.

3. Definition of renewables

In the Energy Law the following types of **renewable energy sources** are qualified as green energy: hydropower, wind power, biomass, biogas, photovoltaic, geothermal. Furthermore, the definition of biomass and biogas is given: **biomass** – substances (of animal or plant origin), which are subject to biodegradation, coming from waste, agricultural or forest production waste, industry waste as well as all the other waste that is subject to biodegradation, **biogas** – gas obtained from the biomass, especially from the installations processing the animal or plant waste, water sewage treatment installations and landfills. Municipal waste incineration doesn't account for renewable energy source, but large hydro does account. The definition of RES and biomass is in compliance with the EU definition.

4. Support mechanism

Poland used to have feed-in-tariffs system but in 2000 this mechanism was replaced

by quota obligation system-introduced with The Quota Obligation Ordinance. Its amendment is in force since July 2003. The key idea of the ordinance is gradual stimulation of the demand for RES electricity and on the other hand facilitating the competitiveness among RES energy suppliers to satisfy the demand. According to it, distribution companies are obliged to purchase a certain amount of green electricity so that the share in the total amount of sold electricity reached is not less than 2.4% in 2001, 2.5% in 2002 up to 7.5% in 2010. The Quota Obligation Ordinance also permits calculation of the energy produced during the process of co-firing of the biofuel (biomass, biogas) with the conventional fuel in proportion to the percentage of the chemical energy of green fuel in total amount of fuel.
There is no break-down of the quota into fractions coming from given technologies, although in the Development Strategy of Renewable Energy Sector there are scenarios assessing the most recommended use RES (biomass, biogas and wind should provide the biggest share in green electricity production). Although the quotas introduced in the Ordinance are ambitious and could guarantee a growing market size, the quota system doesn't contribute to the achievement of national targets. There is lack of legal and financial consequences for distribution companies, which don't fulfil obligation, as the level of penalty has not been stipulated. In such cases the Energy Regulatory Authority (URE) has to sue those companies, and in many cases penalties can be avoided. In 2002 only 7 out of 33 distributors complied the obligation of purchasing 2,5% green energy. There are no mechanisms to guarantee a stable revenue for independent power producers. Prises of electricity are not fixed for a longer period-

Table 1. Prices for renewable electricity (2002, € MWh)

Resource	Price EUR/MWh	Price PLN/MWh
Biogas	47.5	219.93
Biomass	29.4	136.45
Large hydro	45.4	210.57
Small hydro	45.9	213.02
Wind	49.7	230.61

contracts are valid only for one year and have to be renegotiated every year. In tabel 1 there are typical prices for RES electricity in 2002[5].

Another problem for green power producers is that they have to schedule electricity production in advance, which poses serious difficulties especially for wind power sector. In Poland there are no RES targeted development funds, which would provide a stable base for RES financing. Investors can apply for investment grant and/or for preferential loan to: National Fund of Environmental Protection, the respective county and municipal funds; Environmental Protection Bank; ECOFUND and others, but there is no guarantee of receiving the aid. Investors don't receive any production subsidies. However an exemption of RES energy from the excise tax (which is posed on all other fuels and accounts for 0.02 PLN/kWh) is a form of indirect subsidy for the RES energy producers[6].

The existing legal regulations concerning RES are dispersed and often contradictory and as such don't provide support for RES development. There is a need to introduce a one law regulation- RES Act, which will create a solid legal framework for the investments in the RES, by creating an effective RES support mechanisms e.g. Green Certificates System; supporting the quota system with clear regulation on penalties, to assure the implementation of RES purchase obligation; standardisation of the financing system of the RES development through the creation of targeted funds. At the moment RES Act is in preparation in the Ministry of Environment. Unfortunately there are many conflicts between different groups of interests and there is a risk that the prepared act won't provide the expected base for RES development. The draft of the act that is discussed now lacks important support mechanisms, i.e. it does not introduce Green Certificates System nor it provides sources for financing renewable energy sector.

5. Access to the grid

In 2002, the total installed capacity of the power generation plants amounted to 35 GW that fully covered the domestic power demand; there is rather a problem of over-capacity in the power sector, which hinders the development of RES sources. The Polish Power Grid Company (PSE) is responsible for the transmission and

dispatching of electricity. Power distribution and sales are managed by 33 electric energy distribution companies (to be merged into 7 companies). 330 companies perform the trade. The body responsible for energy regulation, Energy Regulatory Authority (URE), issues licenses for generation (necessary for installations over 5 MW), licenses for trade and approves tariffs. Renewable operators are given access to the grid at standard prices and without any priority. They have to cover the costs of interconnection, extension and strengthening of the grid. Moreover they are required (similarly to other power producers) to prepare an expertise on the influence of their devices on the national grid system. The costs are rather high and the expertise can be easily rejected, because there are no clear guidelines for its preparation and evaluation. There can be noticed generally an unfriendly attitude of distribution companies towards access of green energy to the grid.

The procedure of connection to the grid is as follows: preliminary recognition of conditions of connection to the grid, application for decision on the conditions of grid connection, issuing decision on the conditions of grid connection (valid for 2 years), negotiations on conditions of grid connection and electricity sale, signing agreement on grid connection, signing agreement on sale/purchase of electricity (optionally), works on grid connection, trials and acceptance of the terminal. Green electricity producers face a number of barriers. First, the decision on conditions for connection to the grid is valid for two years and reserves a necessary capacity- during this time no other investor can utilise the reserved capacity. This is abused by many investors who - without real plans of installing RES plant- want to reserve the possibility to connect to the grid until it's not necessary to extend it and to cover significant costs of this extension. When the whole capacity of electricity transmission is "utilised", all other investors have to wait or pay costs of the extension. This problem is a bottleneck especially for the wind power sector.

Secondly, the agreement on sale/purchase of electricity is valid only for one year, which doesn't provide any credibility for investor in the point of view of the bank- it is difficult to obtain a loan for investment. There is also a lack of tariffs for transmission of electricity from medium voltage through high and again to medium voltage, thus the utility can refuse to carry out the connection because they do not have tariffs legally approved by URE. Finally, there is the issue related to long-term contracts (LTC). In the 90-ties many producers signed a long term contract with a transmission system operator and wholesaler - PSE. At the moment distribution companies have to buy minimum amounts of electricity at the price approved by URE, which distorts the market - 70% of electricity is under LTC. It is expected that by the mid of 2004 all LTC will be resolved.

6. Administrative procedures

The administrative procedures related to the approval of renewable energy projects are rather complicated and long-lasting. There are no national guidelines for guiding authorities in the process of approving projects. Most authorities which are for the first time dealing with RES project don't know what should be required from investors and in many cases pose formalities, which are not necessary (for example in case of wind turbines some authorities require the assessment of infra-sounds, which are not generated by wind turbines). There is problem of lack of land reservation for RES investments in the counties' spatial plans- when an investor plans a RES plant, there is a necessity to change spatial time, which is a long and costly procedure especially for wind turbines. Moreover some regional spatial plans instead of indicating selected areas for wind power development, state that the whole landscape of the county (voivodship) should be protected, which creates a real barrier for wind turbines development.

There are no plans to develop regional and local spatial plans to guide RES projects- the procedure of changing the plan is quite expensive and most counties and voivodships avoid such costs. A procedure for building RES installation can be illustrated by the case of building wind turbines. It consists of: preliminary localisation of a wind plant, stating the organisational form of investor, preliminary agreements of land purchase or lease, obtaining the conditions for grid connection (more details in section Grid issues), procedure of changing spatial plan, decision on the conditions of building and land management, realisation of the construction project (project of plot management, agreement on the location of wind turbine, technical documentation, agreement on grid connection, environmental impact assessment and others), agreement on construction and finally agreement on wind turbine utilisation.

The wind power sector is also facing a problem of real-estate tax, which in case of energy buildings is equal to 2% of the investment cost, paid every year[7]. For a technology which is already expensive this means delaying the time of paid-back period by one year. A number of actions are needed to overcome these barriers, including: good practices and guidelines for RES investors and local authorities should be developed and widely disseminated; local and regional spatial plans should include land reservation for renewable energy sources installations; and the real-estate tax should be reduced in case of wind turbines.

7. Power Disclosure

There are not any regulations mandating utilities to disclose the sources and related environmental impacts of the delivered electricity. There is no decision in order to implement the obligation of energy mix disclosure introduced in the directive 2003/54/EC.

8. Conclusions

The creation of effective renewable power markets in Poland is currently constrained by the following barriers: difficult co-operation between particular central administration departments in the field of the RES policy; contradictory information on the renewables in different official documents guiding the governmental RES policy; conflict of interests between several lobbies from the RES industry and electricity producers and electricity distributors and long-term contracts; subsidies for the conventional fuels and coal mines as well as the electricity over-production; difficulties encountered when looking for the proper targeted RES development funds; very poor high-voltage grids especially in areas suitable for development of wind energy; and finally over-capacity of domestic power production.

At present the most important issue is to prepare the RES Act, which would create a solid legal framework for investments in the RES. The RES act must urgently create an effective and stable RES support mechanisms, e.g. by establishing a Green Certificates System back up by effective sanctions for non-compliance, to assure the implementation of RES purchase obligation. The standardisation of the financing system of the RES development through the creation of targeted funds is also needed, along with the development of renewable energy plans at regional and local level. Finally, the Act should set the framework for sound collection of statistics on renewable energy resources on the local and regional level.

Concerning the grid issues, the energy law should be amended so that it obliges companies to introduce clear and transparent rules for connection to the grid and tariffs for services of electricity transmission, the priority should be given to renewable energy. Distribution companies should prepare and publish clear procedures and requirements referring to grid connection. High voltage lines should be reinforced to make them favourable for wind development areas (especially in the north of Poland). Finally, to ensure a swift development of renewable energy projects on the ground, local and regional spatial plans should include land reservation for renewable energy sources installations. The real-estate tax should be reduced in case of wind turbines. The procedure related to the approval of RES projects should be adjusted to their specific character and good practices and guidelines for RES investors and authorities should be disseminated.

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Slovak Republic

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1. Summary

Slovakia did not prepare its own official national strategy to stimulate renewable electricity yet. Several studies on benefits and potentials of RE have been produced by different governmental and non-governmental organisations here but their impact on official policy is not visible. Targets and timetables are also not mentioned in national Energy Plan nor there is any political or public discussion to change the present status. Nevertheless a set of policy instruments like tax breaks or investment subsidies for renewables has been adopted quite recently. On the other hand these instruments seems to have no positive impact in the situation where low feed-in tariffs and hardly accessible bank loans for renewable energy projects are discouraging all potential investors. There is no doubt that country needs to commit more efforts and allocate more resources to promote and develop the utilisation of renewable energy sources. Despite the fact that few legislative incentives did not proved to stimulate the development of the renewables yet there is a hope that applying of the EU laws and regulations in this field will change the situation soon.

Targets

Electricity in Slovakia is mainly produced from nuclear, gas and coal power plants. The share of renewable energy sources was 16 % in 2001 where large hydropower plants produced almost all of the green power (see Table 1). The installed capacity of other renewable sources is negligible (biomass) or zero for wind and solar. It is a pity that Slovak Energy Policy produced by the ministry of economy does not send any message towards specific renewable electricity targets. In general it says that under good financial conditions it could be possible to double the share of renewables (total heat + electricity) until the year 2010. Nevertheless a clear targets and timetables are missing. Biomass is considered as the most promising source of energy for heating. Regarding the electricity Energy Policy only defines the technical potential of power production from renewables. These estimates should be seen as the guideline of what is possible under present financial conditions (see Table 2).

Table 1. Power production in 2001 (TWh, %)

Power sources	TWh	%
Hydropower	5,117 TWh	16%
out of which pumped hydro	0,119 TWh	0,37%
Solid biomass	0,153 TWh	0,5%
Biogas	0,001	0,003%
Total power production from all sources	31,9 TWh	100%

Source: IEA Country Submissions (2002)

Table 2. Potential of annual power production from renewables in 2010.

Source	Production (TWh)
Biomass	1, 3 TWh
Hydro	6,6 TWh
Geothermal	0,06 TWh
Solar	1,5 TWh
Wind	0,6 TWh

Despite quite considerable potential the governmental estimates did not mentioned biogas or co-firing of biomass with coal specifically. The potential for biomass is not specified at all. Benefits like job creation and emission reductions related to increased utilisation of renewables and especially biomass are mentioned very briefly in the governmental energy policy. It is estimated that almost 5000 new jobs can be created in the construction and operation of all sources of renewables (including heat sector). Another 5000 new jobs can be created in research, development and other supporting services.

3. Definition of renewables

Renewables are defined indirectly through the Act on Taxes (tax breaks for renewables) or state support scheme for energy savings and renewables. Renewables include solar, wind, biomass, hydro and geothermal energy. In general terms the definition is in compliance with the EU directive. Nevertheless there is a small discrepancy on definition of small hydropower. Under the law on taxation hydropower eligible for tax breaks is defined as the facility rated up to 1 MW of installed capacity. Financial support schemes set the upper limit for small hydro at 10 MW. Renewables do not include industrial waste and non-renewable municipal solid waste. Until now there have been no attempts to re-direct support from renewable sources to the incineration of industrial or municipal wastes. In the official documents biomass is not specified with regards to biogas or co-firing of biomass and coal.

4. Support mechanisms

There are two types of support mechanisms applied in Slovakia. First there is a tax break for renewables (The law on taxation) under which tax exemptions are available to the electricity producers that produce electricity from:

- small hydropower plants (up to 1 MW),
- wind power plants,
- heat pumps,
- solar installations,
- biogas facilities and
- geothermal installations.

Tax break is applied for the income in calendar year in which facility has been put into operation and than for other 5 consecutive years of operation. Tax breaks can be applied also for the reconstruction of renewable energy facility. Second, there is a new support scheme (de-minimis) for energy savings and renewable energy sources adopted by the ministry of economy in April 2003. According to this program eligible subject could receive financial support for construction or reconstruction of renewable energy facility up to 100.000 EUR. Support can cover up to 100 % of bank interest rates, up to 75 % of investment costs or up to 25 % not-investment costs of the facility.

The amount of support depends on the site where the renewable energy facility is placed. Projects in regions with the lower GDP per capita receive higher support. Administration of this scheme, which is scheduled to be in force until Dec. 31, 2006, is done by the Slovak Energy Agency. This support mechanism seems to be quite attractive but it is not clear yet what is the total budget allocated for this program and if all eligible applicants will receive the support. On the other side two discouraging aspects should be mentioned here. First the feed-in tariffs set by the distributing companies are extremely low – recently at the level of 3 EUR cents/kWh for all kinds of renewables. As the result of this most of the potential projects will have long payback times what is usually not acceptable for the domestic banks to finance such a project. This seems to be the crucial issue in future development of renewables in Slovakia. Having this burden any development is highly improbable. There have been several attempts by the NGOs or renewable energy lobby groups to change the policy, but without any success yet.

Another issue is the value-added tax which can be set at a lower level to stimulate the purchase of renewable energy technologies. In Slovakia we have experienced just the opposite direction – towards higher taxation. VAT for solar collectors was increased from 5 % to 20 % and there was no willingness to change it even despite the fact that due to permanently low sales of renewable technologies the VAT revenues for the state budget from these items were practically negligible. On other side the price increase for the

buyers was quite important. Under the new law on taxation, which will come into force in January 1, 2004, Slovakia will introduce equal tax for VAT (all items) and income at 19 % and there are no exclusions or lower rates for renewables.

5. Access to the grid

Grid access is one of few positive aspects related to renewables. The distribution power system operators are obliged by the law to buy renewable electricity offered by the independent power producers and to pay minimum feed-in tariffs, which are defined by them. There are following priorities set by the buyer 1) type of power plant (RE, cogeneration); 2) type of power delivered (sources aimed at delivering of at least 90 % of its production to the grid, sources delivering only excess power, sources delivering only peak or base power etc.).

The following conditions apply. For the site with installed capacity of more than 400 kW the independent power producer is obliged to permanently deliver at least 50 % of its installed power capacity into the grid. Planned outages have to be submitted to the grid operator at least 15 days in head. Feed in tariffs are set at 1,35 Sk/kWh for the low voltage grid and 1,45 Sk/kWh for high voltage grid (1 EUR = 40 Sk). The coefficient bonus of up to 1,3 can be granted to the operator with power plant sited in areas, which are of great importance for the grid operator. Thus the maximal purchase price can be up to 1,885 Sk/kWh. These prices have been set by the grid operator for wind and hydropower installations.

Slovak legislation does not send any message about the priorities regarding the preferences for green power. All potential independent power producers are treated in the same way. Key issue is to meet the technical requirements for the connection of power plant to the grid (quality and amount of delivered power). Power producers are also responsible for covering the cost of extension lines. Three regional power-distributing companies are competent for all technical details and agreements including feed-in tariffs for the purchase of electricity. As a matter of fact they can easily eliminate the benefits of access to the grid by setting of low tariffs what is the reality in Slovakia. There has been no effort yet to change the rules by the government and to push these companies to higher feed-in tariffs.

6. Administrative procedures

It is definitively not easy to realise a renewable energy project in Slovakia. Situation is more complicated due to the lack of special agency providing the help in this business. As for all industrial installations there are several documents needed by the potential independent operator of renewable energy power plant. The district authorities issue construction permits for the installation. In the case of hydropower, also the state company dealing with the river has the power to refuse the proposal for building power plant in their region. Permits for the delivery of power to the grid are issued according to the agreement between power producer and regional power distributing company.

Technical documentation for RE installation like small hydropower plants or wind-mills (as for all other industrial installations) has to include environmental impact assessment. The district environmental authorities review this documentation. The process of approving the project is quite complicated for the newcomer without any legislative background. Clear guidelines prepared by the state authorities are lacking and there are only very few consultant companies who can provide the help. The best situation is in the construction of small hydropower plants. Due to its long lifetime (some facilities are in operation over 70 years in Slovakia) and low operating costs small hydro is considered to be the most profitable renewable energy technology here. Moreover hydro potential is not used and there are also several plants, which could be quite cheaply reconstructed. Few companies are offering help in the process of planning, construction and permitting the power plant.

Unfortunately there is one important missing link - banks. Usually they are not interesting in financing of projects with long payback times. They are also asking for guarantees which independent producers are not able to meet. The most promising RE technology from the financial point of

view – small hydropower – was effectively stopped by the lack of funds here. The situation is changing slowly – the result is the same – no development at all. Companies offering some kind of help related to power production from wind or solar energy (PV) simply do not exists here.

7. Disclosure of power sources

Despite the fact that the EU Directive calls for electricity retailers to provide information to the final customers of the contribution of the various energy sources in the fuel mix and its environmental impacts, nothing has been done with respect to this issue in Slovakia yet. In case of interest the customers are advised to get the information from the internet or asking for it directly from the electricity retailer. Disclosure of information on environmental impacts of power production is not considered to be a problem in Slovakia. There is a law on public access to information related to state authorities in Slovakia. In situation when almost all power plants (99 % of capacity) are owned by the company controlled by the state there exist a possibility to get the information for any member of population. Nevertheless this is far from the aim of EU Directive and it is clear that urgent effort must be taken by the government to change this situation.

8. Conclusions and policy recommendations

Development of renewables in Slovakia is seriously slowed down due to the financial and administrative barriers. Financial barriers are mostly related to the costs of renewable energy technologies which are simply too high for domestic investors. Moreover bank credits are still hardly available for such kind of projects. Long payback times for small hydro up to 15 years due to low feed-in tariffs seems to be here the main obstacle and the biggest challenge for the government. Hopefully examples from neighbouring countries (Austria, Czech republic) or Germany will have an influence on situation in Slovakia. Furthermore it is not clear yet how the upcoming liberalization of electricity market will affect the whole development (electricity prices). In the situation when green electricity is not the priority and when external costs are not included in the final price of electricity from fossil fuels it does not seems that renewables will be the winners.

There is also a lack of special state or regional agencies dealing with renewables in Slovakia. Potential investors or general public do not have access to vital information on renewables and how they can be utilised. This is of great importance especially on regional level and in rural areas where the renewable energy potential could be exploited and where new jobs can be created. Decentralisation of state administration, which is aimed at the transfer of competencies to regional or local authorities, will require more involvement of these authorities in implementation of renewable energy projects. Traditionally regional or municipal authorities are least informed about the benefits of renewable energy projects for their region. Moreover they are flooded with other pressing problems (health, education) and energy issues are simply left by them on the market forces.

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Slovenia

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1. Summary

In Slovenia there is currently no strong policy or strategy for the use of renewables for electricity production. The government is at the moment busy adopting the needed EU legislation. To properly adopt the energy related sections, Slovenia needs to first perfect a National Energy Plan, which is currently being prepared for reading in Parliament. When this plan has been adopted, it is expected that the quantitative goals for use of renewables will be established, as well as the specific measures.

At the moment the feed-in tariff system is in place and represents the main support for the use of renewables. With relatively stimulating prices for 'green' electricity it creates a favourable environment, but it is more of a production incentive, while there is a clear lack of incentives for investments in renewables. One of the main obstacles for the flow of investments to the renewables sector is the unclear and complex administrative procedure for getting the status of a producer of 'green' electricity that can enjoy the feed-in tariff system.

An issue which cannot be pushed aside when talking about renewables in Slovenia is energy efficiency. Without appropriate measures which support efficient use of energy, measures which support the use of renewables will not have a satisfactory impact. Being a country that will join the EU in May 2004, Slovenia is increasingly dependent on the policies and regulations which are shaped by the EU. This gives some hope for the importance of renewables in coming decades. This is because, as it seems at this moment, Slovenia does not have enough internal driving force to release its economy and political dependence from heavily subsidised fossil fuels and nuclear energy and orientate itself towards a self-sufficient and environmentally and socially benign energy system.

2. Targets

In 2001 the share of renewables in gross electricity production was 27.9 % of which almost 99 % is hydro power, and remaining 1% is biomass (mostly combined heat and power (CHP) based on wood, landfill gas and water treatment gas). 25.5 % is large-scale hydropower (> 10 MW), 2.0 % small scale hydropower (< 10 MW), and 0.37 % is estimated[1] to be biomass. The targets are quoted from MOPE 2002. The renewable targets for Slovenia are the same as those in the Accession Treaty: 33.6 % electricity produced from renewables by 2010. There are yet no official projections made for the shares of renewable energies in the future. It is expected that after the National Energy Program enters into force, detailed projections will follow.

The only study that currently exists is the Analysis of Economic Potential of Renewables (MOPE 2002a). According to the study, the expected projections for 2010 are:

- Despite the large potential of hydropower in Slovenia, it would be possible to increase the share of small hydro power plants by 10 to 20 MW by 2010. Such power plants often mean unacceptable changes to the environment.
- By 2010, estimated economic potential of already existing landfills and existing and planned waste-water treatment plants in cities and animal farms are at least 10 to 30 MWe.
- So far the geothermal power has not yet been explored in Slovenia. It is estimated that the first plant with 5 MW power could be built by 2010 (the theoretical potential is estimated to be from 50 to 70 MWe).

- Available potential of biomass is estimated to about 40 MW. Due to the high investment costs it is estimated that a plant with total power from 8 to 10 MW could be built.

- Wind power plants have the biggest potential in Slovenia (apart from large hydro). By 2010, plants for 40 to 80 MW of total power could be built.

- Solar power is too expensive and other renewable sources are not expected to have a significant share in electricity production.

3. Definition of renewables

Renewable energy sources are described in the Energy Law of 1999 as "all energy sources that are replenished or mostly replenished by nature, especially the energy of flowing water, wind, non-accumulated solar energy, biomass, biogas and geothermal energy." Indirectly, waste is excluded, through the definition of 'qualified producers of electricity' (QP). In this definition waste is mentioned separately from renewable energy sources. Technically the definition matches the EU definition, however, the stipulating advantages (such as feed-in tariffs) are linked to the definition of qualified producers of electricity defined in the Energy Law as: "producers who generate electricity in individual production facilities with higher-than-average actually achieved efficiency in the cogeneration of electricity and thermal energy, or who use waste or renewable energy sources in an economically appropriate manner which is in accordance with environmental protection."

Regarding capacity, the Energy Law of 1999 stipulates advantages for QP up to 1 MW. In the regulation on the status of QP (of 2001), four classes by capacity are defined. Large QPs are those that exceed the nameplate capacity of 10 MW. Advantages differ by size and type of QP. Advantages to QP in other regulations are based on the concept of priority dispatch whereby some QP enjoy preferential feed-in prices. For hydropower plants, by regulation of the government on feed-in prices of 2002, no preferential price is defined for plants with a capacity exceeding 10 MW. For other types of plants employing renewables, no upper limit is given.

4. Support mechanisms

Presently, a feed-in tariff is the main policy instrument for the support of electricity production from renewables. Because of the feed-in tariff there are no capital incentives. Whereas all small power plants (up to 10 MW) have been supported by feed-in tariffs since the mid-80's, from early 2002 a new system of feed-in tariffs has been in operation. It is based on one of the provisions of the Energy Law (1999); i.e. the priority dispatch of qualified production. The difference between the market price and the feed-in tariff is covered by network charges, paid by all electricity customers. Network operators are obliged to conclude long-term feed-in contracts with QPs. The following main stipulations modify the feed-in prices:

- if a power plant is connected to the transmission network, the price or bonus is reduced by 5%;
- for plants in operation for 5 or more years the price or bonus is reduced by 5%;
- for plants in operation for 10 or more years the price or bonus is reduced by 10%;
- if the qualified producer has received a non-refundable subsidy from the state, the price is reduced by 5% for each 10% of investment cost, for which the plant has been subsidised;
- the qualified producer can choose a uniform price (or bonus), which is applied to all deliveries of electric power to the grid, according to the following table :

Table 1: Feed-in tariffs for electricity produced from renewable energy sources in Slovenia (valid from April 2002)

type (by RENEWABLES)	other conditions	unit price SIT/kWh	unit bonus* SIT/kWh	unit price c€/kWh	unit bonus* c€/kWh
Hydropower plants	up to 1 MW	14.05	6.05	6.11	2.63
	above 1 MW and up to 10 MW	13.55	5.55	5.89	2.41
QP from biomass	up to 1 MW	16.05	8.05	6.98	3.50
	above 1 MW	15.55	7.55	6.76	3.28
QP by wind	up to 1 MW	14.55	6.55	6.33	2.85
	above 1 MW	14.05	6.05	6.11	2.63
Geothermal QP		14.05	6.05	6.11	2.63
Municipal waste incinerator	up to 1 MW	12.37	4.37	5.37	1.9
Municipal waste incinerator	above 1 MW and up to 10 MW	11.87	3.87	5.16	1.6
Solar QP	up to 36 kW	64.05	56.05	27.85	24.37
	above 36 kW	14.05	6.05	6.11	2.63
Other QP (1)		24,55	16,55	10,67	7,20
Combined QP by RENEWABLES (2)		16.05	8.05	6.98	3.50

Source: Official Gazette RS 25/02.

Notes:

** Any qualified power producer can opt to market the electricity itself and receive a bonus. The implied market price in the unit price is 3.48 €ct/kWh (8 SIT/kWh).*

*** SIT is Slovenian Tolar. Conversion to € at an average rate of 230 SIT/€.*

(1) Power plants using as a primary source, any other form of renewable energy, which is not of fossil or nuclear type. This group includes QP on biogas from animal manure.

(2) Power plants using any combination of the above mentioned renewable sources.

In addition to the choice of a total price or market price plus bonus, QPs can also choose a time-of-delivery tariff (or bonus). Although not included in the definition, the waste incinerators are clearly supported by the feed-in system. The preferential feed-in tariffs are set for all municipal waste incinerators. The prices set for different sources are not all favourable for the use of renewables. The feed in scheme does not take into account neither the geographical differences nor the differences in the impact of investments on sustainable development. The prices for solar power are too low to stipulate its use. On the other hand the prices for wind are considered to be too high. The use of wind power is not an optimal for Slovenia, because there is not enough space for wind turbines in the country.

The feed-in prices are renewed once per year by the government for all types of QP. The prices are determined by the type of production facility, the application of the primary source and the resulting costs of electricity production. The government is obliged to consider the consumer prices index increase, and the expected prices of electricity on the market. For micro-power-plants (below 36 kW), the producer may opt to use the low-voltage supply tariff for households. Two-way counters are used and the subtraction principle is applied. The household tariff is also classed as either simple or time-of-day, with the ratio between the lower and higher tariff being 1: 1.7). Feed-in tariffs are not guaranteed by law thus despite the fact that they are in practical terms (contracts) guaranteed for 10 years, the investors claim to lack strong legal basis for their investments. Investors desire a law on renewable energy that would give stronger legal basis as compared to the actual Decree that might be relatively easily removed or changed by the present or new government. According to the EC directive, all qualified production and production from domestic sources are subsidised from funds allocated for preferential dispatch. The network operators obtain these funds from end consumers as part of the price for using the network. The government sets the subsidised price. CO2 tax can be seen indirectly as a support mechanism as its purpose is to stimulate decreases in use of fossil fuels.

However, due to frequent exemptions, especially for the major coal power plants, this instrument fails to work for renewables.

5. Access to the grid

The producers do not have to pay the network charges unless an extension and strengthening of the grid is needed (this is decided when the installation is plugged into the network or the plug-in power changes). The same rule applies for the producers which cause non-standard variations to the conditions of the Instructions for System Functioning of the Distribution Network. The price for the use of the network does not include the fee for plugging into the network. It includes the costs of the development and the needed investments for upgrading the network. Network access can only be denied in the case of technical or operational limits in the network.

6. Administrative procedures

To obtain the status of QP, the administrative procedure is relatively complicated. To file an application for QP status, the following documents should be obtained: licence for performing energy activities, confirmation of expert qualifications for performing energy activities, registration for performing energy activities, agreement for access to the grid, an energy licence, a contract on selling of heat, a summary of the project, a report on ecological measurements, description of the current situation, a building and use permit. The procedure for obtaining the status of qualified power producer is considered to be an obstacle. In order to profit from feed-in tariffs, the producer needs to obtain an extensive set of legal permissions and technical allowances. Highly complex and time consuming administrative procedures, as well as lack of guidelines and good practice models represent large barriers, especially for small investments and/or investors. It may take a long time before the investor actually receives benefits from feed in tariffs.

To obtain all the documents one needs to contact about 15 different authorities. Information on the exact procedure is only available if one reads the regulations in the Official Journal; the responsible persons in the Ministry are unable to explain the procedure. This is due to the fact that only a few projects have gone through this procedure so far, so basically the procedure is still being established. Such lack of clear procedure, as well as lack of explanation on how to go through the procedure acts as a counterproductive measure for the interested investors. If the investor does not have a proper legal background or is not advised by consultants, obtaining of a status of a qualified producer is very complicated. Therefore it can be concluded that the current system with feed-in tariffs might be working well for the operation of power plants based on renewables, but reaching the operational stage is a tortuous path not yet travelled by many.

7. Disclosure of power sources

Although the energy bills do present the structure of the energy price, including the share of the preferential dispatch costs, the power sources are not disclosed. Access to information on what fuels electricity plants use is relatively good, but it is not possible to easily find out from which power plant the electricity that your distributor delivers to your home is coming. The government is aware of the changes that must occur in this field after accession to the EU, yet there have been no serious discussions on how to disclose power sources to consumers.

8. Conclusions and policy recommendations

One fundamental issue that must be highlighted before other conclusions can be made on the use of renewables for electricity production is the efficiency of energy use in Slovenia. Many people, NGOs, as well as governmental representatives believe that if talking about renewables in Slovenia, we should at the same time discuss the measures to increase energy efficiency - or not talk about renewables at all. The average growth of electricity

use in the last few years is 6% per year and with such a tempo of growth, it will hardly ever be possible to satisfy a relevant share of the electricity needs with the use of renewables. Therefore, it has to be stressed that energy efficiency measures must go hand in hand with measures that support electricity production from renewables.

Having said that, this paper has shown that the renewable energy market in Slovenia is limited by two factors. First, there is still no clear policy on the use of renewables. The upcoming National Energy Plan calls for a clear policy and also strategies and programmes for the use of renewables. However, taking into consideration that the mentioned Plan will only be adopted at the beginning of 2004, the creation of a clear policy on renewables will most likely still be delayed. A clear renewables policy, divorced from utility interests and with appropriate and timely strategies and action plans, is needed to support the use of renewables.

Secondly, there is still not a level playing field between highly subsidised fossil fuels and renewable power. For instance, coal-fired power plants in Slovenia have production costs between 12 and 17 SIT/kWh (approx. 55 to 75 €/MWh) for intermediate service (still mostly base-load), but survive through diverse subsidies. Examples include socialisation of reserve capacity in network charges and application of the 'gross' method for transmission network cost allocation. In this context, the current feed-in tariff for RES and quality CHP only partially compensate such disadvantages.

To swiftly implement the Renewables Directive, the following recommendations should be implemented in a timely fashion:

- **Reform energy subsidy**. The government should make sure that all the external costs of the electricity production in coal or nuclear power plants are internalised to reflect the real price of electricity. Only in such a way can the costs of electricity produced from renewables be competitive and stimulate the use of renewables.
- **Improve feed-in tariffs.** The government should introduce a more differentiated feed-in tariffs scheme that would take into account impact of the investment on sustainable development as well as geographical differences and differences in technological development of renewable energy technologies.
- **Strength institutions.** It is advisable to create an agency that would be in charge of renewables, and under its framework also provide clear information about the process for becoming a QP and also assist interested investors to pass through the process by providing information and guidance. A sufficient step would be: Restructuring of the existing Agency for Energy Efficiency of RS from the Administrative Unit within the Ministry of Environment, Spatial Planning and Energy into a cross-sector public agency in charge of designing and implementing national policy, and to take an active part in designing energy policy. Such an agency could also act as the institution which distributes information about renewables to local authorities and communities where such information is presently critically lacking.
- **Boost public awareness.** Based on the above, the government should, in co-operation with 'green' electricity producers, and NGOs work on increasing awareness among the public. This would also assist in starting a political debate on the disclosure of power sources. Also needed is a broad and long term NGO and media promotion campaign on energy and the environment, especially regarding renewable energy that in particular focuses on 'green electricity'.

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