Renewable Energy Policy review
Slovakia

May 2004

ENERGY CENTRE BRATISLAVA

Energy Centre Bratislava
Ambrova 35 - 831 01
Bratislava 37, Slovakia
Tel: +421 2 593 000 91
Fax: +421 2 593 000 97
http://www.ecb.sk/
office@ecbratislava.sk

European Renewable Energy Council
26, rue du Trone
B-1000 Brussels

Tel.: (+32) 2 546 1936
Fax: (+32) 2 546 1934
www.erec-renewables.org
erec@erec-renewables.org

Slovakia

Introduction – overview (related to the topic)

While renewable energy sources are not currently used to a great extent in Slovakia there is great potential to develop this type of energy. By exploiting the current potential that is economically viable the Slovak Republic could more than double the present use of these resources. Without specific policy measures however only a small percentage of the renewable energy sources economic potential will be realised.

A review of the main barriers to the development of renewable sources leads to the conclusion that while significant changes are needed in the regulatory framework, the lack of access to finance and the general lack of awareness about existing technologies and best practice represent the greatest barriers.

An analysis of past and future national support programmes shows that funds are very limited and that the funding programmes often overlap in terms of topics. EU funding opportunities have not yet been sufficiently availed of Slovakian applicants should be encouraged to participate more actively now in EU programmes, in particular those focusing on renewable energy sources, in anticipation of accession, following which structural funds will become available. Other financing sources, such as Joint Implementation, could provide a substantial support for implementing energy conservation and renewable energy policy in Slovakia.

Development of renewable energy sources is closely related to the general economic and social policy. There is a real potential to contribute to sustainable development and economic growth and can affect all areas of economic activity. Furthermore, Slovakia must also take international commitments into consideration when defining its energy targets. This will require significant institutional, legislative and behavioural changes.

In order to evaluate the success of renewable energy policy, and to adapt priorities according to the results of the evaluation, it is necessary to set quantitative targets in terms of what the chosen policy instruments should achieve. The calculation of low and high targets for energy policy has been prepared for the Ministry of Economy of the Slovak republic in 2002. This shows, that the low targets would mean an 88% increase in the exploitation of renewable energy sources while the high targets would mean a 130% increase from their current 3,2% share from the primary energy sources utilisation. The latter would exceed the objectives indicated by European policy in this field.

Policy instruments have been identified which can turn renewable sources into one of the driving forces of the country's overall economic and development strategy. Some of these instruments deal with general issues such as general policy issues, regulatory and legal aspects, the institutional framework and fiscal, taxation and pricing policy. They are designed to improve the present conditions and would use only a limited part of the available public budget. A limited number of instruments, requiring a higher allocation from the public budget, has also been selected due to their potential to motivate stakeholders and to demonstrate success stories from other countries which could be replicated in Slovakia. The remaining instruments are directly related to address the barriers identified for each type of stakeholder.

The state budget dedicated to renewable energy issues will need to be increased significantly if the proposed targets are to be realised. This increase in budget allocation would enable the

implementation of programmes to significantly reduce energy imports and therefore lead to an improvement in the balance of payments.

The adoption of these instruments could be beneficial for the entire economy. The most obvious impact is related to the level of energy imports, and therefore the balance of payments. The reduction in energy imports is estimated between 8% (low targets) and 12% (high targets) for natural gas, and between 8% (low targets) and 14% (high targets) for petroleum products. Furthermore it is estimated that the implementation of the proposed renewable energy policy could create approximately 10,000 new jobs. The annual reduction in CO_2 emissions has been estimated between 9 million tonnes (low targets) and 16 million tonnes (high targets).

1 General Information

1-1 Population and geography

Slovak republic was established on 1st January 1993. Conventional used short form is "Slovakia". Official language is Slovak. Slovakia is located in the middle of Europe in area 49 035 square kilometers. Slovak republic is geographically landlocked; most of the country is rugged and mountainous.

Slovakia has common borders with five other countries: Czech Republic, Poland, Ukraine, Hungary and Austria.

Population of Slovakia is 5 379 455 inhabitants. The capital of Slovakia is Bratislava (population 428 672). It is divided to 8 Higher-Tier Territorial Units, 8 regions (Bratislava – 599 015 inhabitants, Trnava – 551 003 inhabitants, Nitra – 713 422 inhabitants, Trencín – 605 582 inhabitants, Žilina – 692 332 inhabitants, Banská Bystrica – 662 121 inhabitants, Prešov – 789 968 inhabitants, Košice – 766 113 inhabitants) and 79 districts. Regional capitals are Bratislava, Trnava, Nitra, Trencín, Žilina, Banská Bystrica, Prešov and Košice.

Ethnicity of the population:
Slovak 85,8%
Hungarian 9,7%
Romany 1,7%
Czech 0,8%
German, Polish and others 2%

Population by religion: believers (84.1%) of which:
Roman Catholic (68.9%), Evangelical (6.9%), Greek Catholic (4.1%), Reform Christian (2%), undetermined (2.2%), atheist (13.7%)

1-2 Political system and economical figures

Slovakia is a republic with parliamentary democracy. The constitutional and legislative power has the National Council of the SR, executive power has the president of the SR a government of the SR and judiciary power has the constitutional court a courts.

Main political parties represented in the National Council are Slovak Democratic and Christian Union (SDKÚ), Christian Democratic Movement (KDH), Smer, Hungarian Coalition Party (SMK/MK), New Citizen's Alliance (ANO), Movement for a Democratic Slovakia (HZDS),

Communist Party of Slovakia (KSS). President of the Slovak Republic is Ing. Rudolf Schuster, CSc., Dr.h.c. Prime minister of The Slovak Republic is Ing. Mikuláš Dzurinda.

Slovakia has mastered much of the difficult transition from a centrally planned economy to a modern market economy. The new government has made excellent progress in 2001-02 in macroeconomic stabilization and structural reform. Major privatizations are nearly complete, the banking sector is almost completely in foreign hands, and foreign investment has picked up. Slovakia's economy exceeded expectations in 2001-02, despite the general European slowdown. Unemployment, at an unacceptable 14.5% in 2003, remains the economy's Achilles heel. The government faces other strong challenges in 2003, especially the cutting of budget and current account deficits and the prevention of a revival of inflation.

GDP:
Purchasing power parity - $66 billion (2002 est.)
Real growth rate – 4% (2002 est.)
Per capita – purchasing power parity - $12,200 (2002 est.)
Composition by sector – Agriculture: 4,5%
Industry: 34,1%
Services: 61,4 % (2000)

Currency: Slovak crown, 1 Sk = 100 haliers

Exchange rates: Slovak crown per US dollar: 35 – 36 (2003), 45,3267 (2002), 48,3548 (2001), 46,0352 (2000), 41,3628 (1999), 35,2334 (1998)

The foremost industries in the Slovak Republic are metal and metal products, food and beverages, electricity, gas, coke, oil, nuclear fuel; chemicals and manmade fibres, machinery, paper and printing; earthenware and ceramics, transport vehicles, textiles, electrical and optical apparatus and rubber products.

The main agricultural products Slovakia deal with are grains, potatoes, sugar beets, hops, fruit; pigs, cattle, poultry and forest products.

Production of Electricity in Slovakia was in 2001 30.29 billion kWh. The sources of electricity production are fossil fuel 30.3 %, hydro 16 % and nuclear 53.7 %.

Slovakia exports partners are EU 59,9% (Germany 27.0%, Italy 8.8%, Austria 8.1%), Czech Republic 16.6% (2001) and it imports from EU 49.8% (Germany 24.7%, Italy 6.4%), Czech Republic 15.1%, Russia 14.8% (2001).

2 Energy profile of the country

As one of the transition economy countries Slovakia shows the typical decline in economic and energy consumption connected with the transition process. The decline in energy consumption is not only due to the decline of economic activity but also to industrial restructuring. The economic revival is partly connected with an increase in economic activity and with a shift from energy intensive industry to less energy intensive branches, producing goods and commodities according to domestic and international market demand.

The energy consumption analysis quantifies the energy flows from primary energy sources throughout the individual conversion and distribution to final energy use. Consumption of

primary energy sources directly determines the CO_2 emission level according to the type of fossil fuel type on the total consumption level.

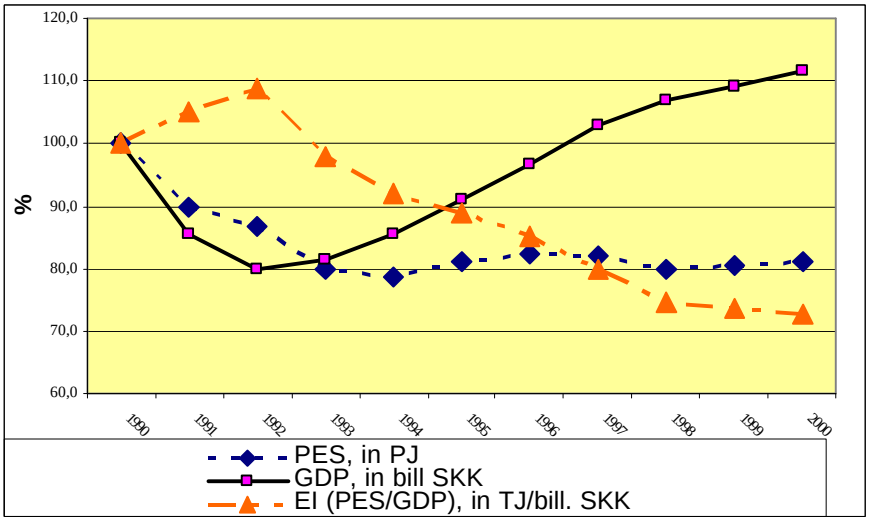
A comparison was performed for the following indicators:

- Comparison of primary energy sources (PES) with the development of GDP
- Comparison of energy related CO_2 emissions with the GDP and PES development
- Calculation of aggregated energy intensity (EI) and carbon intensity (CI), indicating the trend of non-fossil PES penetration as well as the share of natural gas penetration in the national energy balance.

Figure 1 illustrates the trends of GDP, PES and CO_2 emissions between 1990 and 2000, using 1990 as the base year. A few conclusions from the past developments can be drawn:

- Until 1993, all indicators showed the same slightly declining trend;
- Since 1993, the GDP increases, the PES remain stable and CO_2 emissions show a slight decline;
- Solid fuels show a trend of constant decrease, as opposed to natural gas which increases.

Figure 1: GDP, PES and EI Trends in %, 1990-2000



Source: Statistical Office of Slovak Republic, Statistical yearbook 1997 to 2000; Statistical Office of Slovak Republic, Energy statistics 1997 to 2000

The energy consumption in transition economies is mainly influenced by industrial restructuring. In order to obtain reliable information on restructuring in Slovakia, a detailed analysis would be required, focusing on new investments in industry and changes in the structure of commodity production, two issues which are not the subject of this study. The marked decrease in energy intensity is probably due more to a growth in GDP as a result of increasing activity in non-manufacturing sectors and of foreign loans in infrastructure, than to an improvement in industrial technologies.

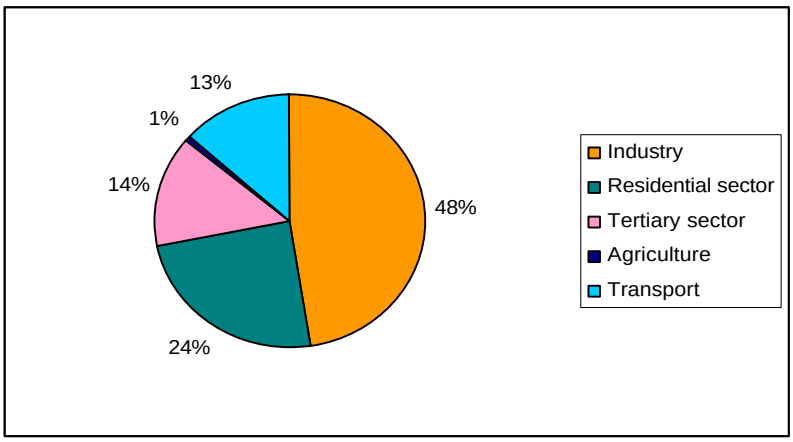
CO_2 emissions follow a trend similar to that of primary energy sources, although with a stronger decline due to the penetration of natural gas and to nuclear energy's replacement of solid fuels. GDP was SKK 667.7 Billion for the year 2000 in fixed prices (reference year 1995) or SKK 887.2 Billion in current prices.

Primary energy sources generated 767,749 TJ in Slovakia in 2000. This includes not only solid, liquid and gaseous primary sources, but also energy from nuclear power plants and a relatively small share of geothermal energy. It also includes the electricity trade balance and electricity from hydro power plants. The gaseous fuels (mostly natural gas) have the most significant share of primary energy sources consumption (32 %), followed by solid fuels with 24 % and nuclear energy (24 %).

The final energy consumption for the base year was 472,148 TJ in 2000, of which 391,143 TJ was heat and fuel consumption (83%), while electricity consumption accounted for 22,501 GWh (81,005 TJ). The difference between primary energy sources and final energy consumption of 295,601 TJ is accounted for through conversion and other loses and energy stock change.

About 48% of final energy consumption is attributed to industry, while the residential sector as the second largest final energy consumer uses 24% of the total. Both these sectors show decreasing trends over the past few years. The transport and tertiary sectors have approximately equal shares in energy consumption: these sectors show slightly increasing trends. This is related to growing economic activities in these sectors. Agriculture has the smallest share of final energy consumption and does not show any considerable change in energy consumption trends over the last few years.

Figure 2: Final energy consumption by sector, 2000, in %



Source: Statistical Office of Slovak Republic, Energy statistics 2000

2-1 Renewable energy policy

The technical potential of renewable energy sources should be divided into different categories. The “full” potential is characterised by existing resources and the possibilities to use them to produce energy by implementing existing technologies. It does not however provide much information, as it is only a theoretical quantity. Therefore, the following terms have been used:

Technically exploitable potential: Potential that can be used by implementing available technologies, limited by legislative, administrative and environmental barriers.
Available potential: Technically exploitable potential limited by other uses of the resource.

Economic potential: Part of the available potential that is economically viable, given the social constraints (legislation, fiscal regulations, equipment and operation costs, discount rates, inflation, etc.).
Market potential: Economic potential, taking market barriers into account (investments risks, expected benefits, etc.).

Going on the basis of existing analyses, the technical potential of renewable energy sources is estimated at 87,754 TJ/year, excluding large hydropower plants (over 10 MW) and 107,820 TJ/year including them. However, as most of the relevant institutions do not consider large hydropower plants as a renewable energy source because of the scale of production, they are excluded from this study. In the case of biomass, the technical potential already excludes uses other than energy for this resource.

Renewable sources have only a 1.6% share in total primary energy consumption; this share doubles if large hydropower plants are taken into account. Only about 17% of the potential for renewable energy sources is currently exploited in Slovakia. This means the unused potential is 73,094 TJ/year.

Biomass is the renewable energy source with the greatest technical potential (46% of all RES). This is closely followed by geothermal energy (26%) and solar energy (21%). The technically exploitable potential for wind is less than 3% of total RES technical potential, and that of small hydropower plants is less than 5%. Biomass has also the highest degree of exploitation (almost a third of total biomass resources are exploited). This is followed by small hydropower plants (19.5%). The other renewable sources are exploited to a lesser extent: up to 5.4% of the identified technical potential of geothermal energy is currently used, while only negligible quantities of solar and wind energy sources are used. As a result, the potential available for further energy uses is still rather high, and corresponds to over 83% of the technically exploitable sources.

In terms of technically available potential, biomass comes first with a share of 38% of the available resources; geothermal and solar energy follow closely with 29% and 26% respectively, while hydropower and wind have only a small share with 4% and 3% respectively.

The market potential was estimated, where possible, on the basis of simple payback periods calculated for different user groups with different expectations. The acceptable payback periods chosen for the study are as follows:

- Industry: 5 years
- Households: 4 to 5 years
- Public authorities: 7 years
- Utilities: 7 years

Table 1. Technically available potential of renewable energy sources, in TJ

Type	Technical potential	Current exploitation	Available potential
Geothermal energy	22,680	1,224	21,456
Wind energy	2,178	0	2,178
Solar energy	18,720	25	18,695
Small hydropower plants (SHPP)	3,722	727	2,995
Biomass	40,453	12,683	27,770

Forest biomass	*6,710*	*1,778*	*4,932*
Energy plants	*6,613*	*0*	*6,613*
Wood industry	*15,862*	*9,497*	*6,365*
Agriculture biomass	*8,359*	*216*	*8,143*
WWTP sludge	*828*	*47*	*781*
Domestic waste	*2,081*	*1,145*	*936*
Total	**87,754**	**14,659**	**73,094**

Source: Energy Policy of Slovak Republic, Ministry of Economy, 2000, updated by EGU for biomass, 2002.

The difference between the economic and market potential, an important indicator for identifying energy policy targets and instruments, varies significantly from one source to another:

- The gap between economic and market potential is smallest for geothermal energy, indicating that little state intervention is necessary to motivate the market actors into investing. A number of geothermal energy projects have been already identified and are planned for implementation by the end of the period considered.
- On the other hand, while biomass has the highest economic potential, its market potential represents only one fourth of the economic potential. This shows that a higher level of state support will be necessary to develop this sector.
- The market potential for wind and solar energy indicates that stakeholders are still facing barriers which need to be overcome before a larger part of the economic potential can be realised.
- Finally, the gap between the economic and market potential for small hydropower plants is smaller and targeted actions only should be needed in order to realise this potential.

The distribution of the different types of potentials according to type of energy generated, heat and electricity, is summarised in the following table:

Table 2. Potential for renewable energy sources in Slovakia, in TJ, in 2012

Type	**Technically available potential**		***Economic potential***		Market potential	
	heat	electricity	heat	electricity	heat	electricity
Geothermal energy	20,384	1,073	7,920	504	4,230	125
Wind energy	0	2,178	0	505	0	150
Solar energy	16,321	2,374	4,250	210	1,260	10
Small hydropower plants (SHPP)	0	2,995	0	749	0	299
Biomass	23,606	4,164	10,058	1,810	2,412	520
Total	60,310	12,784	22,228	3,778	7,902	1,104
Grand total	73,094		26,006		9,006	

Source: NEES Slovakia 2002

Given that geothermal energy and biomass have the highest potential overall, and that they contribute significantly to the production of heat energy, it is not surprising that the potential for heat is higher than that for electricity. While the economic potential for heat represents 36.9% of the available potential, that for electricity represents only 29.5%. This trend is also confirmed in

terms of the market potential, which is 13.1% of the available potential for heat, and only 8.6% for power. This can be explained by the relative difficulty of introducing photovoltaic systems and wind turbines on a large scale.

2-2 Status of resource exploitation

2-2-1 Biomass

Technical potential

Biomass has the highest share of technical potential of RES (42%). This corresponds to an energy value of 40,453 TJ/year. Given the conditions prevailing in the Slovak Republic, it is realistic to use forest biomass, agricultural biomass and waste from wood processing and food industry, to develop energy plants and to use waste biomass from industry in the municipal sector for energy purposes. Considering the present use of biomass resources (12,683 TJ/year), the available potential is 27,770 TJ/year.

Economic potential

It is theoretically possible to install biomass installations in apartment buildings as well as for family houses. However under present conditions, it is most likely that biomass in the residential sector will be used more for single-family houses and district heating systems, including combined heat and power plants, than for large boilers in apartment buildings.

The installation of a biomass boiler in family houses can be seen as economically viable as the investment can be amortised within its lifetime. It can be estimated that about 15% of the family houses using oil or coal-based heating systems will opt for a biomass boiler, when deciding on the replacement of an existing heating system (it is unlikely that natural gas systems will be replaced with oil or coal-based ones).

The installation of a complete DH system based on biomass, is economically viable over its lifetime. What is more likely however is the upgrading of existing DH systems based on fossil fuels (e.g. oil, coal). In the case of a switch from fossil fuels to biomass, it can be estimated that about 15% of all households connected to DH systems would switch to biomass. For CHP, large installations (over 10 MW) can be regarded as more economically attractive than small units, and it can also be estimated that half of the technically available potential is viable, provided that sales of power to the grid can benefit from fair feed-in tariffs.

Waste incineration plants for domestic waste are characterised by high specific investment costs. Such plants can be run profitably over their lifetime (payback period approx. 16 years). Assuming an input of approximately 100,000 tonnes of domestic waste per year to new waste incineration plants, the total heat output generated is estimated at 65% of the available potential.

The economic potential represents approximately 20% of the available amount of waste wood used by the industry for their own energy consumption.

Under the short-term environmental requirements for accession to the European Union, all agglomerations with over 10,000 inhabitants should have waste water treatment plants (in the medium-term this requirement applies to agglomerations with over 2,000 inhabitants) This will certainly result in a drastic increase in the volume of sludge readily available. However, due to

the high level of investment involved in building plants which can use the sludge to gain energy, the economic potential for the use of this resource is considered to be null.

Market potential

The cost of biomass installations in family houses, without any subsidy, would be 35% higher than the cost of gas installations and approximately 62% higher than the cost of coal installations. Similar price levels could be reached only in the case of 50% subsidies, which is not realistic. With a funding level of 30% (which is the average level in some EU countries), the cost would still be 15% higher. In addition, as the acceptable payback period for households is 4 to 5 years and biomass installations have a payback period of 11 years, it is very unlikely that investors will opt for biomass installations. The under-developed fuel supply chain for biomass and the low level of awareness among households about the performance, reliability and costs of biomass systems represent further major barriers to biomass utilisation. As a result, the market potential for biomass for family houses can be estimated at only 2% of the economic potential, if no funding is available.

Biomass is much more competitive for district heating installations, and could reach about the same price level as oil DH systems without any funding. It would still be 17% more expensive than gas DH. Again, taking a realistic level of 30% funding into account, biomass DH would be able to reach the same price as gas, although it is unlikely that installations will switch from gas to biomass. Given the payback period (16 years) for new district heating networks, requiring the installation of the global system (including pipes), as well as the current large coverage of DH networks, the market potential lies more either in small networks, in rural areas, or in the substitution of fuels, especially for systems using fuel oil. As a results the potential for biomass for district heating installations is estimated at 20% of the economic potential. The market potential for co-generation with biomass is rather limited, due to current high investment costs. A reasonable part of the potential (10% of the available resource) could be realised however, provided that operators use the existing support programmes.

One barrier to building further large capacities for treating domestic waste is the long payback period - (16 years), assuming that operators will have to charge high prices for taking over the waste for incineration. This price burden will then be transferred to households through increased fees for waste collection. Reducing these fees will make the plants unprofitable. Therefore, the market potential is estimated at 20% of the available potential.

The following table presents the economic and market potential for the different uses for biomass.

Table 3. Economic and market potential for biomass, in TJ

Uses	Economic potential	Market potential
Individual boilers	1,998	40
DH networks	6,156	1,242
Electricity through CHP	1,810	520
Wood processing industry	1,274	950
Domestic waste	630	187
Total	**11,868**	**2,932**
% of technically available potential	42.7%	10.6%

Source: NEES Slovakia, 2002

2-2-2 Small hydropower plants (SHPP)

Technical potential

The total technical potential for hydropower is estimated at 6,607 GWh/year (23,785 TJ/year). This represents nearly 24% of the technical potential for all RES in the Slovak Republic. This potential decreases to 1,034 GWh/year (3,722 TJ/year) when small hydroelectric plants only are taken into account. This represents 4.6% of the total potential for RES. 19.5% of this potential is presently exploited, leaving an available amount of 831 GWh/year (2,995 TJ/year).

Economic potential

Small hydropower plants are perfectly viable in economic terms under the current conditions in the Slovak Republic. The selling price of 86 EURO per MWh can be used for independent power producers. Utilities will be able to sell electricity at the estimated price level of 130 EURO per MWh (price for households). Independent producers however, will sell electricity for the actual feed-in tariff, which is taken at 90 to 100 EURO per MWh. In this case, small plants are still economically viable. However, the economic potential could be limited by new environmental legislation and changes to existing environmental legislation. Despite the difficulty of evaluating the potential for SHPP, the expert assessment estimates that 25% of the technically available potential could be achieved.

Market potential

Considering that they have a payback period of between 5 and 7 years, for a lifetime of 30 years, small hydropower plants can be regarded as a sound investment. However, investors, especially foreign ones, are presently reluctant to undertake small hydropower plants projects because of perceived risks related to unscheduled delays, due to lengthy administrative procedures and potential opposition from environmental groups. This could be partially compensated in the next few years by the need to produce green electricity under pressure from customers, who may be obliged under national and European directives in the future to purchase a certain percentage of renewable electricity. As a result, the market potential could be estimated conservatively at 25% of the economic potential, or 10% of the available technical potential.

Table 4. Economic and market potential for small hydropower plants, in TJ

	Economic potential	**Market potential**
total	**749**	**299**
in % of available technical potential	25%	10%

Source: NEES Slovakia, 2002

2-2-3 Geothermal energy

Technical potential

The potential of geothermal energy is similar to that of hydropower (including large plants), and amounts to 21,456 TJ/year. The Slovak Republic has good conditions for developing and using energy from thermal water.

Economic potential

Geothermal energy is subject to special economic constraints as investments in this area are associated with a high level of risk. As the energy source needs to be close to the consumer, resources cannot be utilised if they occur in areas with low population density. Therefore, figures on heat flows, reservoirs, average geothermal gradient etc. will not help in defining the real economic and market potential of geothermal energy as such. An expert evaluation suggests than the economic potential could reach 8,424 TJ, or 87% of the exploitable potential. This figure includes a small share of co-generation, where power generation would represent approximately 140 GWh, or 6% of the total economic potential.

Market potential

The market potential is calculated on the basis of individual projects. In some cases the projects are well advanced; technical specifications have been drawn up, funding sources identified and the conditions for their realisation seem to be met. However, given the difficulties encountered by geothermal project promoters in the past, it is estimated that roughly half of the economic potential can be realised.

Table 5. Economic and market potential for geothermal energy, in TJ

Uses	Economic potential	Market potential
DH networks	7,920	4,230
Electricity through CHP	504	125
Total	**8,424**	**4,355**
% of technically available potential	39.3%	20.3%

Source: NEES Slovakia, 2002

2-2-4 Solar energy

Technical potential

There are very few existing buildings in Slovakia which actually satisfy requirements in terms of sufficient thermal quality of the building envelope to allow effective use of solar space heating. Therefore, the utilisation of thermal solar systems for space heating can only be considered for new residential and tertiary buildings. The main potential for solar energy in family houses relates to houses where the heating system is at the end of its life cycle and where it is necessary to invest in a new heating system. A considerable potential for solar energy lies in the field of passive solar systems. In this case improvements in the construction's thermal quality (e.g. through double glazing, orientation of the glass surfaces to the optimal directions) can result in a minimisation of thermal losses and an increase in solar gains. These measures are mainly applicable for new residential and tertiary buildings. The potential for solar collectors in public buildings is mainly related to the preparation of domestic hot water, particularly in school and healthcare facilities, as well as in the hotel sector and sport centres, where hot water is required over the whole year.

Large-scale solar thermal systems, either as stand-alone installations or combined with a district heating plant using another energy source (e.g. biomass or natural gas), are being developed all over Europe. While there are currently no such systems in Slovakia the conditions necessary for their implementation have been met.

Taking Slovakia's economic situation into account, it is more likely that photovoltaic (PV) technology will be installed in places where there is currently no electricity as opposed to replacing sources of energy already in operation. However, the grid presently covers almost 98% of the country. Therefore, public telephones, bus stations in main towns and rest areas on motorways seem to be most suited to the installation of PV technology for security and information devices and lighting.

Economic potential

Thermal solar installations for family houses are moderately cost-effective. On one hand the heating costs saved are rather high, and on the other hand the level of VAT charged is rather high. The investment can be just about reimbursed over the life time of the equipment (with a payback period of 24 years for a life time of 25). Therefore, the economic potential for such installations is considered to be slightly positive, at 216 TJ/year. This corresponds to the equipment of approximately 12,000 family houses.

Solar thermal installations in apartment buildings are rather cost effective, as the amortisation of the investment is much shorter (12 years) than the equipment life time (20 years). Considering that 80% of the apartment buildings use natural gas and geothermal energy, either through district heating or central or individual boilers, the addition of solar collectors could be envisaged only when the heating system is being replaced, or when new buildings are constructed. It is assumed that 10% of the buildings using gas and 40% of those using coal or fuel oil could be potential solar energy users. This means approximately 80,000 flats could be using solar collectors for domestic hot water. This corresponds with an energy consumption of 749 TJ/year.

The cost-effectiveness of solar thermal installations in tertiary buildings is also demonstrated with a payback period of about 9 years. The economic potential for this type of applications is considered to be positive. The potential could be even higher in other buildings such as schools and hospitals, where the discount rate is not yet integrated in the calculation. An estimated 5% of non-residential buildings could adopt solar collectors for the preparation of hot water, representing an energy consumption of 3,595 TJ/year.

Large-scale solar thermal systems are already bringing on economic viability (without any financial subsidies). This could result in a realisation of a substantial part (48%) of the economic potential, especially in the case where transfer of know-how will occur.

Under present conditions, photovoltaic installations are not viable and the economic potential is therefore limited to demonstration projects and promotion activities from private companies.

Market potential

The market potential for solar thermal installations for the preparation of domestic hot water and additional buildings is rather limited if a simple payback period method is applied. In addition, the lack of information among the general public about solar installations, usually perceived as a luxury, further reduces the number of potential private investors for such equipment.

In apartment buildings, where the payback period is rather low (12 years), the potential is also influenced by the lack of awareness.

The acceptable payback period for public entities is estimated to be 7 years. The payback period for solar thermal installations in non-residential buildings, is close (simple payback in 9 years). The installations would be introduced only in case of major retrofitting and purchase of new heating systems. Under these conditions, the investment decision will depend mainly of the level of awareness among decision-makers about solar technologies. It is assumed that this level is presently rather low.

Large solar thermal plants have a rather high potential for realisation under prevailing conditions in Slovakia, although some barriers (especially lack of domestic investors and perceived risks by foreign ones) still remain.

The possibilities to develop photovoltaic installations in the near future are extremely limited. Only private companies are considered capable of implement such technologies, as part of their marketing campaign (e.g. telecom companies).

The potential for solar energy is summarised in the following table.

Table 6. Economic and market potential for solar energy, in TJ/year

Uses	Economic potential	Market potential
Solar thermal in family houses (DHW and heating)	216	25
Solar thermal in apartment buildings (DHW)	749	79
Solar thermal in non residential buildings (DHW)	1,125	171
Large solar thermal plants (DH)	2,160	985
PV	210	10
Total	**4,460**	**1,270**
% of technically available potential	23.9%	6.8%

Source: NEES Slovakia, 2002

2-2-5 Wind energy

Technical potential

The technical potential for wind energy in the Slovak Republic is low, at under 605 GWh/year. This is due to the lack of suitable locations with appropriate wind conditions. Wind energy represents a mere 2,7% of the total RES potential. Appropriate conditions for wind energy means areas with an average annual wind speed of up to 6.5 m/s.

Economic potential

A wind farm in a suitable location (i.e. with a wind speed of 5.5 m/s), which operates approximately
180 days per year and the selling prices calculated for the year 2012 would be economically feasible. On one hand the most appropriate areas for establishing wind farms are located within

national parks. On the other hand the technology is now recognised as economically viable even in less favourable locations. Therefore the economic potential is considered to be almost a fourth of the technical potential.

Market potential

Despite improvements in the economic viability of wind turbines, there are still important barriers to installing them in Slovakia. This is due to the lack of information or interest on the part of the national utilities. It is estimated that the market potential likely to be realised in the next decade will be mostly related to trans-border and know-how transfer projects.

Results for wind energy are presented in the following table:

Table 7. Economic and market potentials for wind energy, in GWh

	Economic potential	**Market potential**
total	**505**	**150**
in % of available technical potential	23.2%	6.9%

Source: NEES Slovakia, 2002

2-3 Review of the main RES barriers

Under its preparations for accession to the European Union, Slovakia has successfully negotiated its Energy Chapter and is harmonising its energy legislation with the *acquis communautaire*. The adoption of the relevant legislation is considered to be proceeding at a good rate and is not expected to present any specific difficulties. The steps taken under the accession process are mainly related to the supply side (e.g. privatisation of utilities, amendments to the energy act, etc.). Many directives and standards related to energy efficient equipment either have been or are in the process of being adopted. The barriers presented below concern only EU requirements which either have not yet been adopted or for which there are currently no plans for introduction. A list of the laws and directives currently relevant is presented in Appendix 1.

The barriers included in this group are as follow:

2-3-1 Lack of precision of the Energy Act

The Energy Act, adopted in 1998 and amended in August 2001, does not yet include some principles established by the EU for the common market of electricity, gas and district heating. The role and responsibilities of the Regulatory Authority are not specified either. Although many EU directives concerning energy conservation and which constitute part of the *acquis communautaire*, have been approved separately, no real state energy strategy has been elaborated.

Slovakia has not yet stated clearly how energy efficiency and renewable sources should be supported. The rights and obligations of energy suppliers and consumers must be addressed in an official document. To give an example, there are currently no sufficient provisions to ensure that energy (especially heat) is supplied to users according to good standards of service, or that the supply could be interrupted in case of non payment by the user.

2-3-2 Lack of integration of energy in public procurement laws

Procurement criteria do not usually take a life-cycle cost analysis into account, thus discouraging the purchase of energy efficient equipment that while requiring a higher investment would involve lower operating costs in comparison with conventional solutions. Additionally, regulations applied in the construction sector to set energy standards for new buildings or retrofitting of existing ones mainly concern energy savings but rarely deal with or promote the use of renewable energy source.

This issue is especially important for municipalities, who have a double role as suppliers of energy (e.g. district heating) and consumers (e.g. as managers of public buildings).

2-3-3 Lack of regulation/legislation on certain technologies (CHP, heat pumps, RES)

Certain technologies, not yet widely used in Slovakia, particularly those that could contribute to the diversification of energy supply, are not sufficiently addressed by the regulatory or legal framework. This is particularly true in relation to:

- fair access to or even preference for CHP or renewable sources in the case of retrofitting or procurement of new equipment;
- the obligation for transmission system operators to accept electricity generated by renewable sources or CHP;
- the determination of the level of energy produced by these sources and;
- the standards for the construction, and site planning and permitting for renewable energy installations.

2-3-3 Lack of co-ordination between different institutions

Various institutions are currently involved in implementing energy policy by providing permits or licenses, carrying out control activities, disseminating information and running funding programmes which can be used for energy efficiency or renewables projects. For example the Ministry of Economy, the Ministry of Agriculture, the Ministry of Environment and the Ministry of Construction offer support for energy efficiency and renewable energy projects (see the following chapter for more details). However, these efforts are not fully co-ordinated, leading to a lack of efficiency in the use of resources.

Moreover, the criteria for granting permits or licenses, while making sense in one sector, could have negative repercussions in the energy sector, if not co-ordinated with the relevant authorities. Several public or private organisations offer services to different market actors (industry, households, etc.), but a large range of advice and support is still not provided.

2-3-4 Unsuccessful local and regional energy planning

Energy concepts have been prepared in most regions of the Slovak Republic, but the majority of the plans have not been implemented. This has a number of reasons, varying from the lack of finance, to the lack of political commitment to energy issues, and to the lack of information of decision-makers. The newly elected regional councils are however now responsible for managing health, educational and environmental issues on the regional level. This should contribute to an improvement of local and regional energy planning in the long-term.

2-3-5 Energy prices

Electricity and heat prices are still set by decree, and their levels are still slightly lower than international energy prices, which are usually considered too low and a barrier for the improvement of energy efficiency. The newly created Regulatory Authority is preparing a methodology for the calculation of new gas tariffs, which will gradually reach the market prices. The Regulatory Office is waiting for the privatisation of the three utilities to be finalised before completing a review of electricity tariffs. Heat prices should also be revised shortly.

The determination of feed-in tariffs for energy generated by renewable sources or co-generation is however not yet on the agenda, and the price calculation for energy generated by CHP or renewable sources is not fully transparent.

Table 8. Energy prices for households, 2000-2012, in Euro cent/MJ

	Natural gas	**Electricity**	**Heating**
Prices 2000 in SR	0.95	5.39	4.43
Expected prices in SR in 2006(*)	1.97	11.19	6.50
International market prices in 2012 (**)	2.84	13.14	N/A.

Source: (*) " Alleviation of social impacts of energy tariff rationalisation in Slovakia", NERA, June 2002

(**)"Energy Scenarios to 2020", Austrian Institute for Economic Research, Nov. 2001

2-3-6 Very limited public funds to support EE and RES at national level

Despite the various sources of public financial support, the overall amount of funding available is very limited (SKK 150 Million, or EURO 3.4 Million). The details of these support programmes are presented in the following chapter (Chapter 4). This budget is insufficient to meet requests from applicants to existing funds. It is even less adequate in terms of financing part of the energy efficiency and renewable energy policy that would be necessary to overcome the most serious barriers presented here. If a real and effective policy is to be implemented, a political commitment has to be made and resources allocated to release its objectives.

2-3-7 Bureaucratic schemes for state support funding

A number of criteria used to select proposals which will be funded by state support programmes are very difficult to meet and *de facto* excludes potentially good projects. For example applicants for state funding may not have any debts. This severely limits the number of eligible private or public entities. Furthermore, the criteria might vary from a scheme to another.

It is essential to review the conditions laid out by each of these schemes, and to prepare common criteria and a common methodology for the selection of proposals.

2-3-8 Lack of interest from banks

A further barrier is the lack of finance available from the private sector. The practices and experience of commercial and development banks do not show any specific favourable treatment of energy efficiency or renewable energy projects. On the contrary, these types of projects often face more barriers than conventional projects.

For example, the size of the related investments, especially in the residential sector, is often considered too small to justify a loan and bundling of projects is not a common practice, due to the unclear responsibilities of the various beneficiaries from the bank's point of view. Due to their lack of familiarity with such projects, Slovakian banks usually perceive them as having a higher risk, and do not consider it necessary to recruit qualified staff to appraise them.

For these reasons, the loan interest rates requested by commercial banks for energy efficiency and renewable energy projects are often high and the conditions and guarantees demanded from the beneficiaries excessive.

2-3-9 Lack of information among users about consumption and energy costs

Lack of information about energy consumption and costs affects all sectors, but is particularly important for industry and the residential sector, for whom it is an essential input for an investment decision. The energy checks presently carried out in industry do not provide sufficiently reliable data to identify energy flows and overall consumption, to identify potential energy efficiency measures and related cost-savings. In the residential sector, it is often difficult for users to monitor their own consumption due to the billing method which often divide the costs according to the number of flats in a building, and not the actual consumption. The issue of energy prices, as discussed above, also contributes to confusion in assessing the real costs.

2-3-10 Lack of information on the availability and reliability of EE and RE technologies
Even if they were aware of their energy consumption and related costs, many potential investors (households, public authorities, building managers, industrial managers) lack information on the technologies that could reduce their consumption. They often do not know where to find this information and are not aware that savings can be realised through simple measures that do not entail a high investment (good housekeeping).

In the cases where information is available, it is usually incomplete and fails to convince end-users that energy savings equipment are reliable and efficient. This is an even stronger issue as far as renewable energy sources are concerned. Additionally, retailers and installers themselves are often unaware of the available technologies, or unable to advise users on the most appropriate equipment to meet their needs. Maintenance services are not properly guaranteed in some cases and this can contribute to a lack of confidence into the technologies available. Architects and planners have also a very limited knowledge about best available technologies, and little experience in carrying projects in this field.

2-3-11 Lack of information on available funding opportunities (at national and European levels)

Information on national programmes providing financial support to energy efficiency and renewable energy projects is disparate and does not present the range of options available to investors. Clear and comprehensive information materials should be prepared to present the options, the conditions for applications and to provide examples of successful projects supported through such funding.

Present access to EU funding and, even more, the future opportunities following accession through the structural funds, is of primary importance to the country. EU funds however need to be better used. In the case of the SAVE Programme for example, the rate of return of the Slovak contribution amounted to approximately 80% in the last 3 years. This means that Slovakia is paying for other countries to participate in European projects.

Several difficulties arise when applying for funding from such programmes. These problems include identifying the appropriate programme; understanding the programme's administrative and technical requirements; identifying partners; the technical gap between projects already implemented in the EU and the needs of the Slovak stakeholders which lead to confusion about what is innovative and what is merely a dissemination of well-proven technologies.

In order to make the most of EU support and the related advantages, mainly experience exchange with other European organisations, it will be necessary to inform Slovak organisations about the available funding opportunities and to encourage them to submit more and better quality proposals.

2-4 Past and current support programmes

For the period between 1992 and 1999, three main programmes were available to projects aimed at energy conservation and the development of renewable energy sources.

2-4-1-1 Reduction of energy consumption in residential buildings

50% of the state budget directed to energy efficiency and renewable energy was allocated to a programme dedicated to the reduction of energy consumption in the residential sector. This programme was operated by the Ministry of Construction and Public Works (now the Ministry of Construction and Regional Development). It consisted of two distinct parts.

2-4-1-2 Rehabilitation and modernisation of heating systems

The second part of this programme was directed to the rehabilitation and modernisation of heating systems, including metering and control systems, and the integration of renewable energy technologies.

The state subsidies available for projects eligible under this sub-programme amounted to approximately SKK 33 Million per year, or 27% of the overall investment costs. They supported the realisation of 177 projects between 1993 and 1999. The average heat savings realised during the period are estimated at 220 TJ per year, which means a ratio of SKK 160 per GJ saved. Additional details are provided in the following table:

2-4-2 Support programme for energy efficiency and renewable energy sources

This programme, supported by the Ministry of Agriculture, Forestry and Water, under the co-ordination of the Ministry of Economy, offered subsidies between 1995 and 1998 for projects to save energy, reduce energy intensity and develop renewable energy sources. The yearly budget amounted to about SKK 30 Million and resulted in energy savings of approximately 160 GJ per year.

Table 9. Performance indicators for the programme "Energy efficiency and renewable energy sources", 1995-1998

Indicator	Unit	1995	1996	1997	1998	Total
State subsidy	MSKK	19.2	40.5	35.6	22.75	**118.05**
Nr. of projects		17	17	33	27	**94**
Energy savings	GJ/year	100.2	275.2	-	-	**Average 187.7**

Source: Source: Ministry of Economy, Slovak Republic, 2000

The state budget presently, funds three main programmes to support energy conservation and the promotion of renewable energy sources.

The total amount of state budget allocated to support energy efficiency end renewable energy projects reached a peak in 2001 with just over SKK 150 Million (EURO 37.5 Million). As these programmes were only implemented recently, only partial data is available concerning their results in terms of savings or energy generated.

The analysis of eligible projects under these programmes shows that there is an overlap between the first fund (for projects on energy conservation and renewable sources) and the second (for projects on energy intensity reduction and the use of alternative fuels and energy sources); and between the first and the third programmes (for projects on housing development) in terms of energy efficiency. Moreover, some sectors, such as transport, do not have any specific budget for energy saving measures.

It is planned that all state support funds will be cancelled or transformed into another form of support by the end of the year 2002. For instance the former State Environmental Fund is transformed into "Implementation of environmental programmes". The recommendations issued in Chapter 6 of this documents should be taken into account for the elaboration of the forthcoming programmes, particularly in terms of harmonisation of procedures, selection criteria and identification of priorities.

2-4-3 Programme supporting energy conservation and the utilisation of renewable sources

This programme, introduced in January 2000 to replace the former programme described under Section 4.1.1, is managed by the Ministry of Economy. The implementing agency is the Slovak Energy Agency.

The programme's objective is to create favourable conditions for investments in energy efficient technologies. The budget is approximately SKK 30 Million per year.

Eligible projects:

1. Energy savings in residential buildings
   - Purchase and installation of regulation and control equipment
   - Retrofitting of heating systems: condensation boilers and CHP units up to 10 MW_e
   - Development of district heating systems and optimisation of their extension
2. Use of renewable energy sources
   - Construction of small hydro power plants
   - Energy use of biomass
   - Installation of solar collectors
   - Use of geothermal energy
   - Use of wind energy
   - Use of heat pumps
3. Promotion of energy efficiency
   - Implementation of energy saving and renewable energy technologies
   - Rationalisation of fuel and energy consumption with significant effects
   - Substitution of fossil fuels, especially through the production of biomass processing technology.

Form and scope of support:

- Partial compensation of loan up to 70% of basic interests (at the interest rate applicable at the date of signature of the loan agreement). It should not, however, exceed 4 Million SKK per project.
- Repayable financial assistance, with a total amount not exceeding 3 Million SKK per project, and a pay-off period of three years. This form of support may be provided only to the projects of Group 1 and only to legal persons.

Financial limits:

- Projects generating electricity savings through the acquisition of new equipment with higher energy efficiency: 1.2 SKK/kWh per year as maximum
- Project generating electricity savings through the installation of energy efficient equipment: 0.30 SKK/kWh per year as maximum
- Projects generating heat savings through the acquisition of energy efficient equipment: 300 SKK/GJ per year as maximum
- Projects generating heat savings through the installation of energy saving equipment: 100 SKK/GJ per year as maximum
- Projects using biomass to produce wood chips, briquettes and pellets: 300 SKK/t of annual production as maximum
- Projects aimed at using co-generation units: maximum 500 SKK/GJ of annual heat production, and maximum 3 SKK/kWh for annual electricity generation,
- Projects using alternative energy sources: maximum 100 SKK/GJ of annual heat production and maximum 4 SKK/kWh of annual electricity generation.

Selection criteria:

- no negative impact on the environment
- investment effectiveness related to payback period
- creation of new job opportunities
- improved export performance
- priority to projects to be conducted in areas with unfavourable climatic conditions and projects using materials, equipment and devices manufactured in Slovakia
- the project must be implemented only in the territory of the Slovak Republic

- additional criteria:

for groups 1) and 3): applicants should be free of debts; the project duration is maximum 12 months; the project must be completed within one year of submission of an application

for group 2): applicants should be free of debts; the project duration is maximum 24 months.

Beneficiaries

- housing co-operatives
- building management companies
- associations of flat owners
- municipalities
- owners or managers of residential buildings and heat generating sources supplying heat to households
- legal and natural persons, doing business under the Commercial Code or the Energy Act, employing no more than 250 employees, with a state-owned participation not exceeding 49%.

2-4-4 Programme for the reduction of energy intensity and the use of alternative sources of energy

The budget for this programme, launched in 1999 by the Ministry of Agriculture under the co-ordination and supervision of the Ministry of Economy, has increased over the last 3 years:

Year	Budget proposed	Budget allocated
1999	SKK 30 Million	SKK9.25 Million
2000	SKK 40 Million	SKK16.2 Million
2001	SKK 74 Million	SKK0.33 Million (one project only)

Eligible projects

- Use of biomass in the agriculture and foodstuff processing sectors
- Use of forest biomass
- Use of solar energy
- Use of geothermal energy for heating
- Use of hydro power
- Use of straw and other forms of agricultural and forest wastes for energy purposes.

2-4-5 State fund for housing development

The housing development fund was created by Act Nr.124/1996 and amended by the Acts Nr.1/1997 and 76/2000. The fund is managed by the Ministry of Building and Regional Development. Only one of the eight topics eligible for this fund concerns energy savings. This is the thermal insulation of family and residential houses. The support can be granted as a loan, as support for loan interest repayments or as an interest-free loan. The highest level support is fixed at 80% of the total eligible costs.

International funds have also been used in the past (based on data for the period between 1993 and 1998) to support energy related projects. The sources of bilateral funding are Switzerland and the Netherlands. The EU provides funding through the Phare and Thermie programmes Funding from international financial institutions (IFIs)comes mainly from the EBRD and EIB.

Unsurprisingly, the EU contribution is the largest, amounting to approximately SKK 269 Million between 1993-1998. Switzerland's support (SKK 131 Million) represents 10 times the amount allocated by the two European banks. The total amount of international funding available between 1993 and 1998 is estimated at SKK 510 Million (EURO 12.75 Million).

2-4-6 European Commission

Since 1999, Slovakia has contributed to the budget of several EU programmes and is therefore eligible to submit proposals for funding. Two programmes, Save (for policy, strategy, marketing and information projects on energy efficiency), and the 5th Framework Programme (research, development and demonstration of energy technologies) funded the largest number of Slovakian projects:

Table 10. Current involvement in EU programmes, in SKK Million

Programme	1999	2000	2001	Total
Save	62.3	70.5	72	200.8
5th Framework Programme	68	110	161	339
Total	130.3	180.5	233	539.8

Source: Ministry of Economy, Slovak Republic, 2002

Several conclusions can be drawn from these figures:

- Although the total budget for Save (at the EU level) is considerably lower than that for the 5th Framework Programme (approximately EURO 12 and 220 Million, or SKK 48 and 880 Million respectively), the participation of Slovakia in the first one is rather high in comparison.
- The involvement of Slovak entities in the 5th Framework Programme has been increasing at a quicker rate than their involvement in Save. This can be explained by the fact that the application procedure and selection criteria for SAVE are more complex and stricter than those for the 5th Framework Programme. It should be noted that the European Commission is now harmonising the application forms, the selection process, the monitoring and reporting of all its programmes.
- As mentioned in Chapter 3, the Slovakian contribution to the Save programme is fixed at SKK 82.5 Million (EURO 2.5 Million). The support attributed to Slovak applicants by EU funds are lower than this amount (about 80% of the contribution in average). Similar data are not available for the 5th Framework Programme. This result means that either Slovakian applications are not successful or that Slovak organisations are not yet fully aware of the opportunities presented by EU funding. Some specific support should be established to assist them in preparing more and/or better applications.

The ISPA Programme addresses energy issues only through its objectives about air quality, and the requirements of the programme do not make it an easy instrument to use for energy efficiency. One of the criteria for eligibility is that the costs be over 5 MEURO, and although bundling of projects is allowed, the complexity of the application form deter applicants to submit proposals. Another criteria stipulates that only public authorities or partly state-owned companies are eligible to the programme.

SAPARD is directed to agriculture, and has roughly the same conditions of eligibility as ISPA. It could be used for the development of energy crops or the promotion of bio-fuels. So far however, it has not be used to its full extent in Slovakia.

After accession to the EU, Slovakia will have access to the structural funds. The eligibility of the regions concerned is negotiated on a regular basis between the national authorities and the European Commission. Energy projects can apply for both direct and indirect support for:

- the promotion of renewable energy and energy efficiency;
- capacity–building;
- training of professionals;
- accompanying measures for less privileged groups, etc.

It is clear that these funds will represent a considerable source of support for Slovakia, since most of the country will be eligible. In the EU, structural funds benefit from the second largest budget after agriculture. Therefore the nation must be prepared to manage this injection of resources, in terms of strategy, planning, management and evaluation.

2-4-7 Bi-lateral co-operation

The main sources of bilateral funding in the past were Switzerland and the Netherlands. Other countries, such as Germany, Austria, Denmark and the United States of America also provide technical assistance, but their involvement in energy projects was somewhat limited in the past.

In the very near future, substantial sources will be available to Slovakia through joint implementation mechanisms, to realise large investments relating to both energy efficiency and renewable energy sources. Joint Implementation (JI) is one of the 3 flexible mechanisms defined in the Kyoto Protocol (Clean Development Mechanism – CDM and Emissions Trading – ET are the 2 others). In a JI project, two Annex I Countries (industrialised countries) jointly implement a project, where the emission reduction is transferred from the host country to the investor country.

One of the basic concepts of a JI project is that the activity or measure has to be additional to what would otherwise happen (defined as the "baseline"). So JI projects are additional to national policies and measures a government is introducing. In the case of the Slovak Republic, JI projects could be implemented supplementary to measures defined in the action plans for energy efficiency and renewable energy. The advantages of these projects are manifold:

- As not all of the emission reductions of greenhouse gases will be transferred to the investor country, Slovakia will receive part of the reductions generated. This increases the probability of Slovakia to meet their commitments or create additional credits for emissions trading.
- Projects implemented will not only reduce CO_2 emissions, but also have other positive effects as reduction of other emissions (SO2, NOx,…) or additional income.
- Additional investments are created, bringing more foreign money to the Slovak Republic.
- Potentials, which are difficult to access can be realised through JI.

2-4-8 Other international institutions

The involvement of IFIs in energy efficiency and renewable energy sources in Slovakia has been practically non-existent in the last few years. The Slovak Government has underused this source of funding until now. It should take the opportunity now to request IFIs to fund some of the projects listed below before the country becomes a member of the EU. After accession it is very likely that recourse to support from these institutions will be extremely limited if not stopped altogether.

The European Bank for Reconstruction and Development recently announced its intention to direct funds towards the establishment of independent power plants operated by private investors. The form which this support will take and the amount available are not yet known. Other support for energy conservation and renewable energy in the future, namely from the European Investment Bank, the World Bank and the Global Environment Fund, has not yet been determined.

2-4-9 Commercial banks

The practices and experience of commercial and development banks do not show any specific favourable treatment of energy efficiency or renewable energy projects. On the contrary, these types of projects often face more barriers than conventional projects.

For example, the size of the related investments, especially in the residential sector, is often considered too small to justify a loan and bundling of projects is not a common practice, due to the unclear responsibilities of the various beneficiaries from the bank's point of view. Due to their lack of familiarity with such projects, Slovakian banks usually perceive them as having a higher risk, and do not consider it necessary to recruit qualified staff to appraise them.

For these reasons, the loan interest rates requested by commercial banks for energy efficiency and renewable energy projects are often high and the conditions and guarantees demanded from the beneficiaries excessive.

2-5 Past and current renewable energy policies

The development of renewable energy sources in Slovakia is limited by a series of technical and non-technical barriers. These are described in Chapter 3, and summarised below.

The common perception is that RE equipment involves much higher investments than equipment required for conventional energy sources, although the operational costs are lower. The present price distortion in Slovakia also means that heat and power generated from independent sources at on average more expensive than heat and power generated from conventional sources.

Furthermore, a lack of organisation among manufacturers of the equipment and within the supply chain (especially for biomass) and the lack of knowledge among those who install and maintain the equipment have contributed to the perception that renewable energy technologies, are unreliable.

Renewable energy technologies are often seen as a "luxury", which could moreover have negative environmental impacts (e.g. disturbing water flows, noise from wind turbines).

Therefore a number of instruments have been prepared to overcome some of these barriers, in accordance with the potential for the development of RES presented in Chapter 2.

The following instruments are suggested as incentives to support renewable energy developers, promoters and operators, in particular small independent producers, who are usually faced with more non-technical and non-financial barriers than large utilities.

Site planning/permitting
All renewable energy installations, but in particular hydropower plants, wind turbines, geothermal systems and large biomass and solar thermal plants, can face difficult and lengthy administrative procedures before being able to operate. It is suggested that existing procedures be studied and recommendations made on acceleration of site planning and permitting processes. This should encourage investment from promoters, reduce the risks of refusal of their permit applications and decrease their costs by decreasing potential delays in construction works.

Interconnection standards
The status of the adoption of international interconnection standards (from CENELEC and the International Electro-technical Commission) for renewable energy in the Slovak Republic should be reviewed. Awareness of the contents of these standards should be raised through professional meetings and events (such as fairs, and workshops).

Bio-fuel blending in existing petrol

The Slovak government should adopt the EU existing Directive 98/70/EC which permits 5% of existing motor fuel to be ethanol. It should then commission a report in conjunction with Slovnaft, the refinery owner, and representatives on the issues associated with incorporating various levels into the fuel mix (the EU bio-fuels directive is likely to consider raising this amount).

Guidelines for new building developments
It is recommended to investigate the integration of a minimum renewable energy element in all new large housing estates and large buildings, in accordance with the proposed EU Energy Buildings Directive. Guidelines should be drafted for this and a series of meetings held with builders to get input on how this can be done.

Proposed other general policy measures

2003	The Ministry of Economy prepares the adoption of the EU Directive 98/70/EC to encourage the use of bio-fuels and their mix in petrol.
2004	The Slovak Standards Institute reviews international interconnection standards and proposes a strategy, including dissemination of information, for their implementation in the Slovak Republic.
2004	The Ministry of Construction and Regional Development prepares guidelines for building promoters on the integration of renewable energy into new buildings.
2004-2005	The Ministry of Construction and Regional Development reviews existing site planning and permitting procedures for renewable energy installations and issues suggestions for their improvement, including the means to enforce new regulations. The results of this study are disseminated broadly among local and regional administrations, as well as among operators.
2005	The Ministry of Economy will commission a study, in collaboration with Slovnaft, on the various levels for blending bio-fuels with conventional fuels.

2-5-1 Information and awareness

Raising awareness on the potential economic and environmental benefits of renewable energy, especially among the general public and private operators is a slow process, one which is still at an early stage in Slovakia.

The level of public awareness about renewable energy technologies is insufficient. Such technologies are often perceived as a luxury, not fully reliable and not adapted to the needs of users. A series of national information campaigns should be prepared to overcome this problem.. These campaigns should include information on simple applications of renewable energy sources, existing financial schemes (including Third Party Financing) and successful uses of renewable energy technologies.

Experiences from abroad show that public awareness-raising measures lead to a significant increase in the use of renewable energy in the residential sector, especially for biomass and solar thermal energy. Information campaigns should use different media including articles in daily newspapers, popular magazines, short TV spots, TV and targeted discussions on the radio and

information leaflets. An abundance of information material already available on the European level could be adapted and/or translated for such campaigns.

The first step in a comprehensive strategy for promoting renewable energy sources is to identify:

- the contents of the information to be disseminated;
- the most appropriate means of reaching the target groups and;
- how to involve stakeholders in the dissemination strategy.

Only then can efficient tools be successfully developed. Further steps include the provision of support to market actors in developing capacity to produce and install efficient equipment (by way of networking, experience exchange, training, etc.) and in gaining access to capital (through joint ventures, third-party financing, commercial banks).

For a clearer presentation, this section is divided in two parts; the first ones presents the actions directed towards a professional audience, while the second presents actions targeting the general public.

2-5-2 Actions for professionals

RES panels of experts

The establishment of working groups of experts to support public authorities in implementing the renewable energy strategy, especially as far as information is concerned is proposed. This working group should be co-ordinated and supervised by the Ministry of Economy. These groups would be composed of experts participating on a voluntary basis with a permanent core team, common to all renewable energy working groups, as well as temporary members depending on to the type of renewable energy. Representatives from relevant public institutions, consultants and research institutes could constitute the core team for all renewable energy sources, while in the case of biomass for example, biomass associations, manufacturers, farmers, companies exploiting and transporting the resources and users would be temporary members.

The groups would be to identify the detailed measures needed to increase public awareness in the field of renewables, e.g.:

- to identify the content of information campaigns in detail;
- to discuss and propose changes regarding the legal and regulatory framework and;
- to initiate dialogue among the different stakeholders.

It is suggested that the first panel of experts established address the biomass sector. Its main tasks would include the improvement of the fuel supply chain, support to the Ministry of Agriculture and the Ministry of Economy for launching the programme promoting biomass in district heating systems, and the preparation of the first information campaign. The biomass working group should be established first. Then different panels of experts can be established separately for each of the following:

- heat pumps;
- solar thermal energy and;
- small hydropower.

At a later stage, on the basis of the results from the first group, panels for geothermal and wind energy could also be constituted.

A number of local organisations already work to inform the general public and other market actors in Slovakia about renewable energy. However their aims and activities need to be redefined and adjusted to the needs of their target groups. Their activities should in particular be closely co-ordinated with regional and local energy planning.

2-5-3 Regional and local energy support

An efficient means of providing regional and local support services is through regional and local energy agencies. Such agencies are usually initiated by municipal governments. They are partly supported by the European Commission (through the SAVE programme) for the first three years of operation, and can benefit from experience exchange with other European regions. They should provide services to local business and institutions (municipalities, regions), as well as to the general public, and provide economic, financial, technical and legal information on energy efficiency and renewable energy sources. They should focus on national and EU support for energy efficiency and renewable energy projects, energy management, good house-keeping, TPF and energy auditing.

2-5-4 Heat pumps

A specific instrument should address the installation of heat pumps in the residential sector. Given the prices for drilling, investments costs are often considered to be rather high in comparison to more conventional sources. However, much progress has been made in this field and the efficiency of the pumps has been demonstrated under many different climatic conditions. The main purpose of this instrument is to encourage equipment suppliers, installers and public authorities to develop the use of heat pumps by producing information on European associations and networks that could help them elaborate a strategy for the penetration of their technologies. The definition of concrete objectives in terms of market shares and of the steps necessary to stay competitive should produce concrete results in terms of the development of this sector. Leaflets and other publications could also be prepared and distributed during national energy information campaigns. Training for installers should also be considered part of this strategy.

Proposed information and awareness-raising actions for professionals

2002	The Ministry of Economy and the Ministry of Agriculture identify the composition of the panels of experts for renewable energy sources. The core team for all working groups is established in addition to the experts for the biomass, heat pumps, solar and small hydropower groups are selected.
2003	The first panel of experts on biomass is established, under the supervision of the Ministry of Economy. This panel is responsible for making concrete recommendations on the development of the sector.
2003-2004	Establishment of the principles of the RES network by the Ministry of Economy. The activities should be consistent with those of similar European networks. The network should function at least over the period considered here (until 2012).
2004	The Ministry of Economy initiates co-operation with heat pump manufacturers and installers, with the aim of defining the conditions for public support of the sector, including the preparation of information

	tools and the integration of their representatives into the expert panels for the sector.
2004	Establishment of one expert panel on solar energy and another on small hydropower, under the supervision of the Ministry of Economy. These panels are responsible for making concrete recommendations regarding the development of the respective sectors.
2004	Establishment of the panel of experts on heat pumps, under the supervision of the Ministry of Economy. This panel is responsible for making concrete recommendations for developing the sector.
2006-20012	Preparation and establishment of an additional four regional and local energy agencies according to the procedures indicated above.

2-5-5 Actions for the general public

2-5-5-1 Information platform

An effective way of providing information on RES to different target groups is by establishing an information platform providing free advice services, e.g.:

- advising the general public on how to use RES (biomass heating installations, solar thermal collectors);
- providing information about biomass district heating networks and;
- providing information about financing schemes.

This platform could be organised by the local information centres or energy agencies, with the support of the renewable energy industry and public authorities.

2-5-5-2 Information campaigns

Information should be disseminated to the general public through a series of information campaigns, covering both technical information (uses of the various technologies, types of products, networks of installers) and general information on renewable sources (environmental benefits, improvement of the energy supply, funding opportunities, etc.). The campaigns should be organised under a common umbrella (format of information tools, supporting organisations) and use similar tools: leaflets, promotion materials (pencils, T-shirts), television spots, conferences, fairs, demonstration projects, etc. Equipment suppliers and installers should be associated with these campaigns and be asked to contribute financially to the campaign organisation. The preparation and organisation of the campaign should be tendered to consultants with a good track record in the marketing area.

First of all a general campaign should be organised to raise awareness about the integration of renewables in residential and tertiary buildings, including solar (thermal and photo-voltaic) systems and heat pumps. This can be followed by a specific campaign on biomass boilers for households and another on all renewable sources for local authorities (biomass district heating, bio-fuels, solar thermal and photovoltaics, geothermal energy).

The results of these campaigns should be carefully monitored and documented. An analysis of questionnaires distributed during the campaigns would allow an assessment of their level of

awareness. Such a survey could also include a telephone survey of sample of the population before and after the general campaign.

Proposed information and awareness actions for the general public

Mid 2003	The Ministry of Economy organises a tender and selects an independent company to organise the information campaign for renewables.
End 2003	The first information campaign on renewable energy sources is organised under the supervision of the Ministry of Economy. The campaign focuses on the integration of RES in buildings. The progress and results of the campaign are monitored and evaluated.
2004	The second information campaign on renewable energy sources is organised under the supervision of the Ministry of Economy. This campaign focuses on biomass boilers for the residential sector. The progress and results of the campaign are monitored and evaluated
2004-2012	The Ministry of Economy establishes an information platform on renewable energy. A tender is organised and following this an operator selected to design and manage the web site.
2006	The third information campaign on renewable energy sources is organised under the supervision of the Ministry of Economy. This campaign addresses local authorities.