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VIRTUAL BALKAN POWER CENTRE FOR ADVANCE OF RENEWABLE ENERGY SOURCES IN WESTERN BALKANS

WORKSHOP 2.2. (WS 2.2): Regional Aspects of RES promotion Mechanisms

AGENDA

Faculty of Electrical Engineering, Bulevar kralja Aleksandra 73, Belgrade, Serbia and Montenegro
09 – 10 November, 2005

Wednesday, 09th of November		
9^{30} – 10^{00}	**Registration**	
10^{00} - 10^{15}	**Welcome and Introduction**	
10^{15} – 10^{45}	**Imapct of Current Greek Legislation for RES-electricity Production on Energy Balance and Economy**	**CRES**
10^{45} - 11^{15}	**Regional Aspects of RES Promotion Mechanisms for the Greek Islands**	**ICCS/NTUA**
11^{15} - 11^{30}	**Overview and Recommendations for RES Policies in Croatia Based on Australian Experience**	**UNI-ZG**
11^{30} – 12^{00}	**RES Promotion Mechanisms in Macedonia**	**CMU**
12^{00} – 13^{00}	**Discussion**	
13^{00} - 14^{30}	**Lunch Break**	
15^{00} - 15^{30}	**Overview of Existing RES Regulation in SCG**	**DMSG**
15^{30} – 16^{00}	**Overview of RES Regulation in Spain**	**Comillas**
16^{00} – 17^{30}	**Discussion**	

Thrusday, 10th of November

09^{00} - 09^{30}	**Market Based Support for RES-E via Green Certificates in Slovenia**	**FE**
09^{30} - 10^{00}	**Overview and recomendation for RES regulation in BiH based on international expirience**	**UNITZ/INTRADE**
10^{00} - 10^{30}	**Prospectives of Serbian Regulatory Agency**	**Reg. Agency of Serbia, Dr Goran Tanic**
10^{30} - 11^{00}	**Biomass promotional mechanisms, applications and effects in WB countries**	**Istrabenz**
11^{00} – 12^{00}	**Discussion**	
12^{00} – 12^{30}	**End of workshop**	
12^{30} – 14^{00}	**Lunch**	

Sixth Framework Programme, Priority 6
Sustainable Development, Global Change and Ecosystems
Contract: INCO-CT-2004-509205

Participants

Acronym	Institution	Participant
FE	University of Ljubljana, Faculty of Electrical Engineering	Dr. Andrej Gubina
JR	JOANNEUM RESEARCH Forschungsgesellschaft m.b.H.	Dr. Reinhard Padinger
ICCS/NTUA	Institute of Communication and Computer Systems / NTUA	Dr. Pavlos Georgilakis
UNITZ	University of Tuzla, Faculty for Electrical Engineering	Prof. Suad Halilčević
CMU	Faculty of Electrical Eng., Ss. Cyril and Methodius University	Prof. Vlastimir Glamočanin
DMSG	DMS Power Engineering Group ltd	Elena Boškov
ETF	Faculty of Electrical Engineering	Prof. Nikola Rajaković
UNI-MB	Univerza v Mariboru, Fakulteta za elektrotehniko	Mag. Andrej Hanžič
UNI-ZG	University of Zagreb, Faculty of Electrical Engineering	Vesna Bukarica
FE	University of Ljubljana, Faculty of Electrical Engineering	Tomaž Oštir
ISTRABENZ	ISTRABENZ	Borut Del FABBRO

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Virtual Balkan Power Centre for Advance of
Renewable Energy Sources in Western Balkans

Balkan Power Center Report

Regional Aspects of RES Promotion Mechanisms

Workshop T.2.2, WP 2

Faculty of Electrical Engineering, Bulevar kralja Aleksandra 73,
Belgrade, Serbia and Montenegro
9^{th} – 10^{th} November, 2005

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Editorial Office

Balkan Power Center
University of Ljubljana, Faculty of Electrical Engineering
Tržaška 25, SI-1000 Ljubljana, Slovenia
Tel: +386 1 4768 222
Fax: +386 1 4264 651
Email: info@balkanpower.org

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INDEX

Summary

The two days workshop WS 2.2, entitled “Regional Aspects of RES promotion mechanisms” was held at University of Belgrade, Faculty of Electrical Engineering (ETF), in Belgrade, Serbia and Montenegro. The Workshop belongs to the project “Virtual Balkan Power Centre for Advance of Renewable Energy Sources in Western Balkans”, project acronym: VBPC-RES, Contract INCO-CT-2004-509205, under the Sixth Framework Programme, International Cooperation (INCO). The Workshop No. 2.2 is a part of the Work Package 2 (WP2) of the VBPC-RES project.

From the technical point of view the contributions reflect the different experiences of the authors on the presented topics. The contributors presented many interesting details regarding RES promotion mechanisms. The contributions were understandable and a benefit for the audience.

The Organizing Committee welcomed representatives of the Serbian State Energy Regulatory Commission, Municipality of Belgrade, Ministries of Science and Industry, graduate and postgraduate students, interested entrepreneurs and the participants of the project. All of them have actively discussed the best solution regarding the RES promotion mechanisms through the region.

At the beginning of the workshop Prof. Rajaković, of University of Belgrade, as the host and the organizer of the workshop (WS) greeted the participants. His speech emphasised the importance of the appropriate RES promotion mechanisms that can help into the process of building the awareness of population regarding RES. His presentation comprised a short review of our tasks and the way of our collaboration. The program of the WS comprised 8 contributions from Project Partners. The main points of their contributions are presented below.

V. Glamočanin, Ss. Cyril and Methodius University, FYROM: “RES Promotion Mechanisms in Macedonia”

The harmonization of legislation in Macedonia with EU directives and policy ensues through several international agreements: Stabilization and Association Agreement between Republic of Macedonia and the EU, Energy Charter Treaty, PEEREA, GEF, Kyoto protocol, etc. He explained the exploring of the socio-economic environment of use of energy, and the basic indices of energy poverty of the population in Macedonia. Power sector affordability currently is a problem for many consumer groups in Macedonia. It is obvious that the area which is wide open for the improvements is energy efficiency sector. In addition, SHPP is of primary interest of the public bodies, but also of interested international investors. These two areas of interest are concerned with the new Energy law which includes Energy Efficiency Module, Renewable Energy Sources Module and Environmental Protection Module. However, the penetration of other RES in the country is still facing objective barriers.

A. F. Gubina, University of Ljubljana, Slovenia: "Market Based Support for RES-E via Green Certificates in Slovenia"

Electrical energy has become trading commodity and can have different price and quality, also with regards to its energy source. Electricity from renewable energy sources (RES-E) has become an important factor in European Union (EU) efforts for sustainable development as well as in trading. EU and Slovenian legislation already prescribes the way for tracking and marking the source of energy. One step further are the voluntary systems for green certificates, which in addition to tracking of the energy source also trace the information reliability, consistency and its transparency.

International markets with RES-E are continually developing in new ways. The established green certificate market is expanding, featuring new organized market platforms to increase price transparency. In addition to RECS certificates, which have proven to be a good mechanism for selling RES-E, GoOs are gaining on visibility. On the other hand, retail markets for RES-E products based on green certificates differ in many ways, mainly due to differences in national legislations and other characteristics of national electricity markets. The drive to harmonize European energy labels for RES-E (e.g. Eugene) is positive as it leads to transparency of the retail market and facilitates comparison of different RES-E-based energy labels across Europe. This is the first step to expand the RES-E retail market to international level.

The Renewable Energy Certificate System (RECS) is briefly presented. RECS system which was established in Slovenia in cooperation with RECS International and Energy Agency of Republic of Slovenia (AGEN-RS) is the cornerstone for setting up of the RES-E market in Slovenia. We present a retail RES-E product "Modra energija" (Engl. Blue or Wise Energy) that enables the customers to choose the electricity from the environmental friendly source and the mechanisms for its quality assurance. Judging by current results, the quick and efficient development of the RES-E market in Slovenia can be expected.

C. Karytsas, K. Karras, M. Birmpili, Centre for Renewable Energy Sources Greece "Impact of the current Greek legislation for RES electricity production on the energy balance and economy"

Greek legislation considering the Renewable Energy Sources (RES) electricity production has evolved significantly the past twenty years. The most significant change has been noticed in 1994, the time that a new law underlying the start for RES development in Greece was implemented.

The aim of this paper is to examine the current Greek legislation considering the RES electricity production as well as to estimate:

- The effect it had on the Greek energy production,
- The impact it had on the economy,
- The environmental benefit from avoiding the emission of CO_2 to the atmosphere.

In conclusion, it is estimated that there was a positive effect to all three categories mentioned above.

The past few years there was an increase of the installed electrical capacity from RES in Greece which has lead to a significant decrease of CO_2 emissions. Moreover there was an important economical benefit due to the increased number of RES investments realized and the consequent creation of several working positions.

V. Bukarica, M. Božičević, Ž. Tomšić, D. Jakšić, University of Zagreb, Croatia: "Overview and Recommendations for RES Policies in Croatia based on the Australian Experience"

The Australian experience in a wider introduction of renewable energy sources is presented. The so-called Minimal Renewable Energy Targets has been thoroughly presented, because of the similarity to the model proposed in Croatia and as a role model how a comprehensive state-level approach to the issue of renewable energy should be conducted.

N. Hatziargyriou, P. Georgilakis, A. Tsikalakis, National Technical University of Athens, Greece: "Regional Aspects of Renewable Energy Sources Promotion Mechanisms for The Greek Islands"

The regional aspects of renewable energy sources promotion mechanisms for the Greek islands are presented in the paper. The main points of the Greek laws for the promotion of RES are presented along with the current status of RES promotion. The Greek laws 2244/1994 and 2773/1999 are the driving forces for RES promotion. The Regional Energy Centres and CRES have an important role in the promotion of RES. The policies and incentives for RES are presented and evaluated for wind energy production in Crete. The incentives for RES in combination with the renewable resource potential are crucial factors for the competitive pay back of RES investments. Recommendations and conclusions are drawn for the promotion of RES in Greek islands.

S. Halilčević, University of Tuzla, Bosnia and Herzegovina A. Ajanović, Intrade, Bosnia and Herzegovina "Overview and Recommendation for Renewable Energy Sources in Bosnia and Herzegovina Based on International Experience"

In the paper, the overview of the European Community and United States of America experiences and their directives regarding the renewable energy sources (RES) and their introduction in to energy network is presented. Through the overview of their practice and legislation we have found the elements of RES promotion and mechanisms that can be conducted to make legislation framework of RES policy in Bosnia and Herzegovina.

E. Boškov, DMSG, Novi Sad, Serbia and Montenegro: "Overview of Existing Res Regulation in Serbia and Montenegro"

A presentation of Serbian energy reforms and priorities in the coming years is drawn. The first priority encompasses improvements of technical and operational performance of energy production systems/units, i.e. the programs for technical and operational improvements of energy conversion/transformation systems. The second Priority takes into account the rational energy use and improvements of energy efficiency. The third priority selects the usage of renewable energy and environment acceptable production technologies. The fourth priority presents the short-term investment in new power and heat production units, in the case of prosperous economy and power deficiency. The fifth priority presents the medium/long-term capital-intensive investment in new capital energy infrastructures.

B. del Fabbro, Istrabenz Energetski Sistemi, Nova Gorica, Slovenia: "Biomass promotional mechanisms, applications and effects in WB Countries"

The paper reviews the case for a good promotion strategy of RES, where the core goal of biomass promotion is an increase of the usage of biomass. It investigates the institutional barriers into promotion of RES and provides guidelines for their removal. Biomass promotion must be designed in accordance to the specifics of each country/ environment. In the paper it is proposed to overcome the above mentioned barriers by building of awareness and capacity, provide more information about biomass potential and alternatives for biomass utilization, by increasing capacity on the supply side and improving the biomass projects financially by changing Investors perception on potential of biomass business as investment and by securing additional funds or better financing options

Conclusion

The primary goal of RES promotion mechanisms is to increase the usage of renewable energy sources. During the Workshop WS 2.2 different regional practices have been analyzed and a comparison with the experience from leading European countries in this area has been made. The idea was to present a sort of applied regulation in WB countries and in Europe. This can be done by overviews of different regulations, promotion mechanisms, and best regulation examples from the world and impact on future RES regulation in WB countries.

1 Impact of the current Greek legislation for RES electricity production on the energy balance and economy

Constantine Karytsas
Kostas Karras
M.Birmpili [1]
Dr. P. Georgilakis[2]
Centre for Renewable Energy Sources, Athens
19th Marathon Avenue,19009 Pikermi, Greece
Phone: +30 210 6603300, FAX: +30 210 660-3301, e-mail: kkarras@cres.gr
[1]Geothermal expert M.Sc.
[2]National Technical University of Athens

1.1 Abstract

Greek legislation considering the Renewable Energy Sources (RES) electricity production has evolved significantly the past twenty years. The most significant change has been noticed in 1994, the time that a new law underlying the start for RES development in Greece was implemented.

The aim of this paper is to examine the current Greek legislation considering the RES electricity production as well as to estimate:

- The effect it had on the Greek energy production,
- The impact it had on the economy,
- The environmental benefit from avoiding the emission of CO_2 to the atmosphere.

In conclusion, it is estimated that there was a positive effect to all three categories mentioned above.

The past few years there was an increase of the installed electrical capacity from RES in Greece which has lead to a significant decrease of CO_2 emissions. Moreover there was an important economical benefit due to the increased number of RES investments realized and the consequent creation of several working positions.

1.2 EU Directive 2001/77 on "Power production from Renewable Energy Sources (RES) in the local power market"

In the respective Greek Annex, Directive 2001/77 foresees an indicative target of 20.1% coverage of the gross power consumption from RES including large-hydro, by year 2010. This target is compatible with the international requirements against Greece deriving from Kyoto

protocol signed in September 1997, in the convention-framework of the United Nations for Climate change. Kyoto protocol foresees for Greece restraint of greenhouse-gases increment by 25% in relation to the base-year 1990. Taking into account that by year 2010 the gross power consumption will have reached 72 TWh there is a need of RES participation at a level of 14 TWh.

1.3 Development of Greek legislation considering Renewable energy sources Electricity production

Greek legislation considering the Renewable Energy Sources (RES) electricity production has been evolved significantly the past twenty years. RES were introduced to Greece with the law 1559/1985 “regulation of renewable energy sources items and special items of electricity production from conventional fuels and other provisions”.

Within the scope of this law Public Power Corporation (PPC) installed 24 MWe and the local governmental authorities 3 MWe. At this point private investors were kept out of scenery.

The most significant change in legislation has been noticed in 1994, where the law 2244/1994 “regulation of items considering electricity production from renewable energy sources and conventional fuels and other provisions”, underlies the start for RES development in Greece.

This law set standard selling prices of renewable energy at levels equal to 90% of midst potential prices and obligated PPC to buy it. Nowadays this price is 0.06868 €/kWh for the mainland and 0.07973 €/kWh for systems not connected to the mainland network.

Law 2702/1999 (article 11) appointed the coordinating role, in matters considering RES, to the Center of Renewable Energy Sources (CRES), which was founded in 1987. The aim of this Center is to promote RES as well as energy saving and the rational use of energy.

Law 2773/1999 maintained the favorable Renewable Energy selling prices and emphasized in the matter of priority access to the network. The most controversial aspect of this law was the 2% fee of selling renewable energy that was imposed to the local governmental authorities. Although discount potentiality was given to the minister of development, it was not yet used.

Regulatory Authority for Energy (RAE) was founded in accordance with article 4 of this law as an independent administrating authority that supervises and controls the energy market and the observance of the regulations. RAE recommends to the competent minister legislation changes considering RES, express opinion about RES installation licenses and observes the progress of the construction works.

Hellenic Transmission System Operator (HTSO) was foreseen in article 14 of this law in order to supervise and control development, operation and service of the system through out the Country as well as the connections with other networks so that electricity power supply would be achieved in a sufficient, safe and financially beneficial way. RES commercial administration was undertaken by HTSO in 2002.

The increasing investors’ interest in some regions of the country such as south Crete, Laconia, Euboia, that have high wind potential, caused severe reactions of the local

communities. Moreover the investors were discouraged due to lack of provisions for RES installations in forestall areas. These blanks of legislation were covered by the law 2941/2001 “Simplification of funding companies and license proceedings; Renewable Energy Sources and other provisions”.

Some of the main aspects of this Law are:

- The exceptions standing for large scale public works inside forestall areas are expanded to RES,
- There is no demand of construction license to install solar stations or wind parks, except from civil engineer works,
- Works that connect RES electricity production stations to the connected continental Country network or the independent island networks can be constructed by any investment according to the standards set by the system and network administrator,
- Renewable energy production works, including connecting network, substations and foundation works, are considered to be works of common benefit, regardless of the constructor identity, so real estate expropriation or energy corporation foundation is possible or even compulsory,
- The possibility of ministerial decision issue is provided, in order to set more beneficial terms of construction than the existing in areas apart from city plan,
- Environmental licenses are issued from the competent for installing and operation licenses district departments in order to avoid bureaucracy.

Greek parliament officially committed to act against the deterioration of greenhouse effect with the law 3017/2002 “Ratification of Kyoto Protocol at the convention-framework of United nations for the climate change”.

Law 3175/2003 “Exploitation of Geothermal potential, district heating, and other provisions” sets for the first time regulations for the rational use of geothermal energy. The new framework is compatible with the European Community legislation that considers geothermal energy as a renewable energy source which contributes to sustainable development. A geothermal energy field is now considered as one deposit-source. Specific competition proceedings are being established that concerns the whole spectrum of products and byproducts.

The main purpose of this law was to revise the law 2773/1999 so that the problems considering the deregulation of the energy market due to the dominating post of PPC. Moreover it corrects the obscurities considering the hybrid installations. Energy produced from these systems is now subjected to the same regulations as the other RES and can be sold at the same favorable prices. Moreover this law simplifies the procedure of necessary expropriations in order to expand the lines that connect RES electricity production installations to the network.

RES installation license procedure has been simplified with the joint ministry decision 1726/2003 “procedure of primary estimation and evaluation of environmental terms approval, intervention approval, forest or forestal area concession, in the terms of providing RES electricity production installation licenses”.

A further simplification of those procedures is achieved with the law 3010/2002, in the terms of the directive 77/2001/EC, which reduces the number of different consulting departments to the less possible.

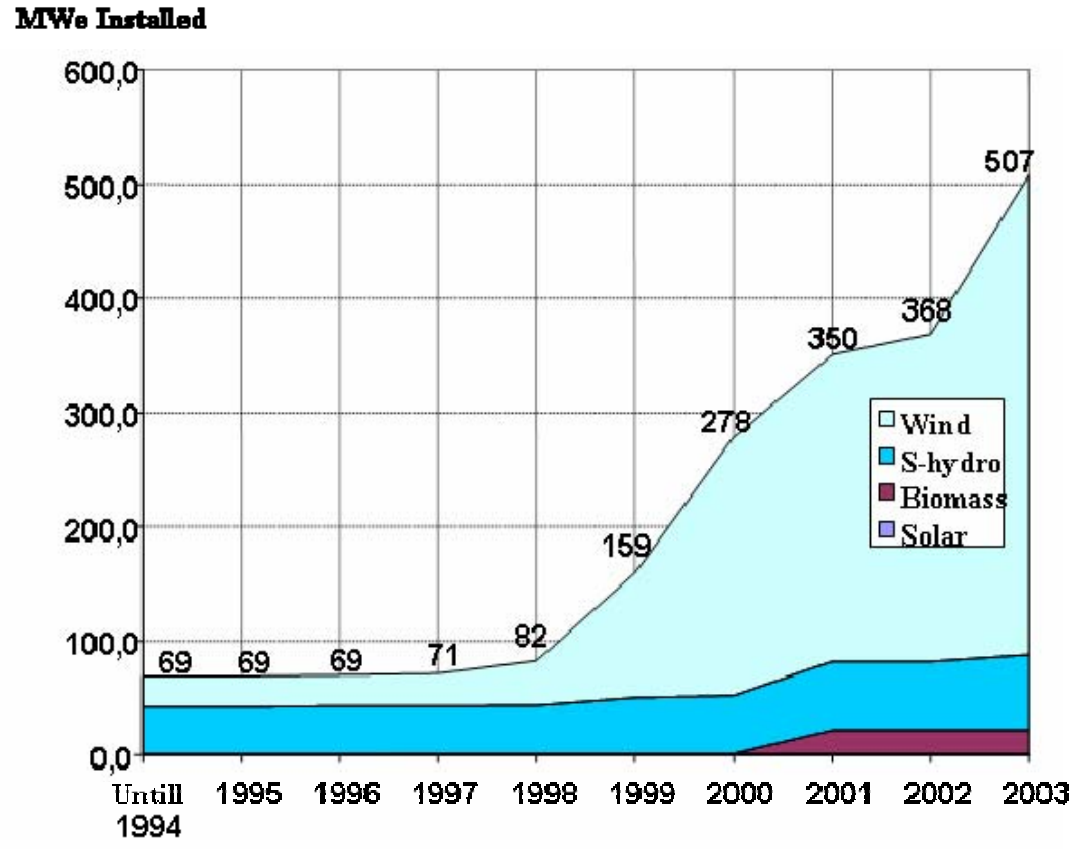
The most recent ministry decision considering RES installation licenses is 2000/2002.

1.4 Basic elements of the Greek power system, and predicted development of RES-power production for years after 2004

Public Power Corporation (PPC) was established in 1950 with main aim the power production and distribution. Presently the Greek power sector operates in the framework of Directive 96/92/EC for the liberalization of power market (OJL27/30.1.1997) and the respective national legislation. PPC plays a fundamental role in the Greek power market, given that it has the exclusive exploitation right of lignite mines, of the high enthalpy geothermal fields for 3 islands (Milos, Nisyros and Lesbos) as well as a low purchase price of Natural Gas.

Power consumption in year 2002 reached 50.6 TWh. The installed power capacity of PPC is 11.736 MWe, while the total capacity of auto-producers plus production from RES is 515 MWe. Transmission lines in the interconnected system reach 200.989km. The number of PPC customers is 6.700.000.

Figure 1.1. RES Accumulative Installed Power Capacity in MWe



The annual accumulative installed power capacity from RES for the period 1994-2003 is shown in **Figure 1.1.**

The main fossil fuel for power production (59.1%) is indigenous lignite of rather low calorific value, participating with an annual quantity of 70.300.000 tonnes. Oil as either Heavy Fuel Oil or Diesel is mainly used in the autonomous power generation systems of islands (14.0%). These systems are not interconnected with the mainland power system. Natural Gas is imported from Russia or in the form of Liquefied Natural Gas (LNG) from Algeria and it covers 12.7% of the total amount of fossil fuels used for power production. The large hydro plants produce 6.3%. Finally, wind power, small hydro plants, biomass and photovoltaic represent 2.4%, whereas imports covered the rest 3%. Concerning power exchanges among the neighboring Balkan countries, Albania, FYROM, Bulgaria and Greece there are connections able to cover more than 7% of the Greek power needs mainly from the power excess of Bulgaria and Romania.

The annual increase rate of power demand is foreseen to be 3.6% for the mainland as well as the autonomous systems. Based on this scenario it is estimated that by year 2010 power needs of the country will have reached 72 TWh.

1.5 Current situation of RES installations and PPC hydro-power stations

According to CRES's internal study the total RES electricity production in Greece reached by the year 2001 1.02 GWh, of this 74.12% from wind parks, 18.14% from small-hydro installations and 7.75% from biogas. In the year 2002 no differentiation could be noticed, due to the minimal increase in the installed power capacity. Updated data for RES systems in which large-hydro systems have been included are presented on **Table1.**

Table 1.1: Installed RES power capacity in MWe (inclusive data from 2003) Note: Figures in parentheses refer to systems that were put in commercial operation in 2003.

		Wind	**Large-hydro**	**Small-hydro**	**Photo-Voltaics**	**Biomass**
Interconnected system	Operating	170.95	3060	16.3	0	24.96
	Under construction	246.06 (127.8)	161.6	69.2 (17.3)	0.4 (0)	0.9 (0.9)
Non-Interconnected system	Operating	101.21	0	0	0.17	0
	Under construction	44.66 (18.82)	0	0	0.5 (0.33)	0

1.6 PPC hydro power stations

PPC operates 15 large and 7 small hydro systems with a total installed power capacity of 3060 MWe which produced 3.381 TWh during the year 2002, as shown on **Table 1.2**. It should be stressed that during the year 2003 energy production reached 5.0 TWh.

It must be noted that the increase rate of the number is not expected to follow the expected demand increase. Thus, by year 2010 the contribution of large hydro systems will be 6.1%, even if all the systems of **Table 1.2** are considered to be in operation.

Additional PPC hydro-power projects are programmed to operate commercially by year 2010 with a total energy gain of 1.582 TWh.

Table 1.2: PPC Large and Small hydro stations.

Region	**Station name**	**Installed Capacity (MWe)**	**Energy production (TWh)**
East Macedonia & Thrace	Thisauros	384.0	0.568
	Platanovrissi	116.0	0.140
Western Greece	Kremasta	437.0	0.512
	Kastraki	320.0	0.374
	Stratos	150.0	0.174
	Stratos II	6.2	0.008
	Glaukos	3.7	0.011
Western Macedonia	Poliphito	375.0	0.266
Eperus	Louros	10.3	0.032
	Pournari	300.0	0.223
	Pournari II	33.6	0.033
	Aoos riv. sources	210.0	0.131
Thessaly	Tauropos	130.0	0.115
Central Macedonia	Agios Ioannis	0.7	0.001
	Vermio	1.8	0.005
	Agras	50.0	0.022
	Edessaios	19.0	0.018
	Makrochori	10.8	0.018
	Assomata	108.0	0.090
	Sfikia	315.0	0.441
Crete	Agia	0.3	0.001
	Almiros	0.3	0.001
Peloponnesse	Ladonas	70.0	0.188
Sterea Hellas	Giona	8.5	0.009
Totals		**3060.2**	**3.381**

1.7 Hydro power stations owned by private (not PPC) corporations

There exist 24 private (not PPC) small-hydro systems operating with total capacity 18.83 MWe and production ability of 0.064 TWh. **Table 1.3** presents these systems and their capacities in various country regions.

Table 1.3: Small hydro stations of the private sector, in operation

Region	**Installed Capacity (MWe)**	**Number of units**
East Macedonia & Thrace	0.94	1
Central Macedonia	6.45	11
Eperus	1.79	3
Thessaly	2.40	3
Western Greece	5.12	3
Sterea Hellas	1.13	2
Peloponnesse	1.00	1
Totals	**18.83**	**24**

Moreover, PPC constructed on the isolated system of Ikaria island an hybrid RES system. The system consists of a typical hydro power unit combined with two pumps-filled-reservoirs of 3.8 MWe power, assisted by a 2.4 MWe wind-park. The system is planned to produce annually 0.014 TWh.

1.8 The current regime of public subsidies for RES investments

RES projects of total budget of € 1.061 billion were financed by the **2nd European Community Support Framework** which was terminated at the end of 2002. Financial cost and energy data of Operational Energy Program-sub-program 3 are presented on the following **Table 1.4**.

Table 1.4: Brief cost and production elements from RES power installations which are financed by resources of the **2nd European Community Support Framework**

	Wind	**Small-hydro**	**PV**	**Biomass**	**Total**
Number of applications	14	9	15	13	**51**
Final budget (in million €)	124.5	17.2	6.1	48.5	**196.3**
Total public cost (in million €)	49.8	7.7	4.2	22.9	**84.6**
Total installed power capacity (MWe)	116	11.5	0.74	8.74	**128.98**
Annual power production (TWh)	0.335	0.053	0.001	0.168	**0.557**

In addition the projects were co-financed by the Greek ministry of economy in the framework of law 1892/1990and law 2601/1998. Approximately one third of the operating RES power stations have been financed by national resources.

The Operational Program "Competitiveness" uses resources from the **3rd European Support Framework** and provides public aid for RES, energy conservation, energy substitution and other energy activities of €1.02 billion in total. The percentage of public aid is 30% of the eligible cost and can reach 50% in the case of electric networks connecting RES installations to main electric transmission networks.

According to the approved projects programming increase of installed power from RES and Combined Heat and Power (CHP) will reach 930 MWe which corresponds to annual power production of 3.4 TWh. The respective annual CO_2-emissions reduction will reach to 3.95 million tonnes, whereas 675 working positions will be created and 160 enterprises will enjoy actual benefits.

In parallel, a project implementation, of total power 600 MWe, is foreseen using national resources by the year 2010. This magnitude reflects the continuing trend to national resources, given that the support percentage is bigger. Specifically, in small hydro project cases, the eligible budget is also increased, as these projects cannot achieve scale economies.

The aforementioned projects, in combination with the existing large hydro projects, are not sufficient in order to achieve the target of 20.1% power coverage, so there is a need of private investments. The lack of public subsidization is compensated by the stabilization of the investing environment. It is assumed that during the oncoming years support of the renewable kWh price will be continued so that projects bank-financing will be facilitated.

1.9 Current technical interventions to increase the transmission capacity of power transmission networks

Regions of high wind potential (Aegean islands, south Euboia, east Peloponnesse, Thrace) have already attracted a large number of investors. The main feature of distinguishing windy, though sparsely populated, areas is the insufficiency of obsolete power transmission system infra-structure. This fact underlies an additional barrier to further penetration of RES power.

Interventions are foreseen by PPC to enforce the transmission ability of the network at the areas of south Euboia, Laconia and Thrace. These areas present high wind potential and consequently investors have expressed intense interest.

Regarding Crete, Rhodes and other non-interconnected Aegean islands the barriers put from the transmission networks, limit the absorption ability of wind power to 30% of the installed capacity, i.e. to roughly 240 MWe. Regarding the rest of the country the wind potential is rather limited except certain areas where the local wind flow acceleration conditions make them exploitable. The magnitude of respective wind-parks installations is estimated to 600 MWe.

The following **Table 1.5** shows briefly the maximum wind power capacity for all the country by year 2010. The evolution rate of the transmission networks has been taken into account as well.

Table 1.5: Optimistic estimation of wind power penetration by 2010

Region	**Installed Capacity (MWe)**
Euboia, Andros, and Tinos islands	700
Laconia, East Arcadia prefecture	280
Thrace	350
Crete, Rhodes and other non-interconnected islands	240
Rest of the country	600
Total	**2170**

Power production in Greece is centralized as until recently PPC has been the only power producer. Continuous control of the numerous small RES-power units is a sophisticated procedure, undertaken by the Regulatory Authority for Energy (RAE). Realization of such control in a free power market environment imposes special pricing techniques in parallel with power production conventional sources in order for the best price to be achieved.

This problem becomes more difficult in the case of autonomous islands power systems with hybrid systems of a significant installed power. These problems are faced by the Code of Network Management.

Institution of a guarantee for the origin of Renewable energy, as it is foreseen by Article 5 of EC Directive 2001/77/EC, should be undertaken by the System Manager. The System Manager as well issues the Energy origin guarantees in the interconnected as well as the not-interconnected systems. In parallel, R.A.E., which is actually an authority independent of power

production and distribution, will undertake the supervision of the guarantees issuing as well as that of possible conflicts solving.

1.10 Conclusions

In the near future the realization of works for the enforcement of the networks is expected. In parallel, an estimate of the RES penetration potential by year 2010 can be drawn, based on the RES economic potential and the consequent investors' interest. The estimate results are shown on **Table 1.6.**

Given that all the investments mentioned in the previous paragraphs are realized the target set by Directive 2001/77 could be fulfilled.

Table 1.6: Optimistic estimate of RES-power production by year 2010.

	Installed capacity In year 2003 (MWe)	**Installed capacity Estimate for 2010 (MWe)**	**Power production, by 2010 (TWh)**	**% per RES-type by 2010**
Wind	420	2170	6.08	8.45
S-hydro	66	475	1.66	2.31
Large hydro	3060	3680	5.47	7.59
Biomass	8	125	0.99	1.37
Geothermal	0	8	0.06	0.09
Photovoltaic	0	5	0.01	0.01
Total	**3461**	**6463**	**14.27**	**19.82**

In the case of which only capital subsidy will be provided the penetration levels will approach 14% and the target of Directive will not be achievable and the conservative estimate of **Table 7** would be closer to the reality.

Table 1.7: Conservative estimation of RES-power production by year 2010.

	Installed power capacity In year 2003 (MWe)	**Installed power capacity Estimate for 2010 (MWe)**	**Power production, by 2010 (TWh)**	**% per RES-type by 2010**
Wind	420	1200	3.36	4.67
S-hydro	66	200	070	0.97
Large hydro	3060	3680	5.47	7.59
Biomass	8	100	0.79	1.10
Geothermal	0	8	0.06	0.09
Photovoltaic	0	5	0.01	0.01
Total	**3461**	**5193**	**10.39**	**14.43**

The institution of green-certificates commerce (in the form of indirect subsidy of the price of Renewable kWh), as well as the attraction of foreign investments especially in the light of saturation of the networks of Germany and other countries in relation to their ability to absorb renewable energy, the target of Directive 2001/77 could be achieved.

Greece tries very hard on institutional, regulatory, technical and subsidies level to achieve the indicative target of 20.1% of Directive 2001/77, through the liquid environment caused by the liberalization of the power market after the regime of one power production company for more than half a century.

1.11 References

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2 Regional Aspects of Renewable Energy Sources Promotion Mechanisms for The Greek Islands

Nikos Hatziargyriou
Pavlos Georgilakis
Antonis Tsikalakis
ICCS / NTUA, School of Electrical and Computer Engineering, Division of Electric Power
Iroon Polytechniou 9, GR-157 73 Athens, Greece
Phone: +30 (210) 7723661, FAX: +30 (210) 772-3659, e-mail: pgeorg@dpem.tuc.gr

2.1 Abstract

This paper presents regional aspects of renewable energy sources promotion mechanisms for the Greek islands. The main points of the Greek laws for the promotion of RES are presented along with the current status of RES promotion. The policies and incentives for RES are presented and evaluated for wind energy production in Crete. Recommendations and conclusions are drawn for the promotion of RES in Greek islands.

2.2 Harmonization with European Union

Greek legislation considering the Renewable Energy Sources (RES) electricity production has evolved significantly the past twenty years. In the respective Greek Annex, European Union Directive 2001/77 foresees an indicative target of 20.1% coverage of the gross power consumption from RES including large-hydro, by year 2010 [1].

RES were introduced to Greece with the law 1559/1985 [2]. The most significant change in legislation has been noticed in 1994 with the law 2244/1994 [3]. This law sets standard selling prices of renewable energy at levels equal to 90% of midst potential prices and obligated Public Power Corporation (PPC) to buy renewable energy.

Greece follows the feed-in tariff model, according to Greek laws 2244/1994 and 2773/1999. The main points of the legal framework for RES installations in Greece are the following:

- RES and CHP installations do not participate in the electricity market, they are priority dispatched and their energy is sold at fixed tariffs.
- RES electricity is remunerated at price linked to the general customer tariffs. Energy is paid 90% of the respective retail price for island systems and 70% for the mainland.
- In mainland, the produced power is compensated at 50% of the applicable consumer tariff. In island power systems no such credit is applicable (only to energy produced).
- For CHP using non-renewable sources similar tariff system applies, as well as for self-producers.

2.3 Present status of RES promotion

There are several organizations that promote renewable energy sources in Greece. These organizations can be grouped as follows:

- Governmental bodies, and
- Non-Governmental bodies.

2.4 Governmental Bodies

The governmental bodies are organizations that are financed by the Greek Government. The main governmental bodies that promote RES in Greece are the Centre for Renewable Energy Sources (CRES) and the Regional Energy Centres.

The Centre for Renewable Energy Sources was founded in September 1987. The aim of CRES is to promote RES as well as energy saving and the rational use of energy [4].

The Regional Energy Centres make significant efforts in informing the citizens of specific regions about RES and also for promoting RES. There are offices at various Greek Islands. The Energy Centres in Greek islands are the following:

- Regional Energy Centre of Crete [5]
- Regional Energy Centre of North Aegean [6]
- Regional Energy Centre of Cyclades islands
- Regional Energy Centre of Dodecanesse islands

The Regional Energy Centre of Crete defines the energy police of the region of Cretein collaboration with the Greek Ministry of Development and the Public Power Corporation of Greece. Regarding the installation of RES, the objectives of the Regional Energy Centre of Crete are the following [5]:

- Maximization of RES penetration in the energy system of Crete
- Maximization of RES private investments (wind parks, photovoltaics, biomass, solar, small hydro, etc) for environment protection and creation of new jobs
- Study and implementation of reverse pumping storage systems (water management, RES maximum penetration, management of the conventional electrical system)
- The Region of Crete is already in the Forefront as a pilot area of extensive innovative projects of RES in Europe and in Mediterranean.

Regarding the rational use of energy and energy saving, the Regional Energy Centre of Crete positions itself as follows [5]:

- The rational use of energy concerning electricity and other energy forms, could contribute to the decrease of power and energy peaks, to the more cost effective management of the whole energy system as well as to the environment protection and the creation of new jobs.
- Maximization of the rational use of energy private investments (cogeneration, etc) could contribute in the development of all the economic sectors: agriculture, industry, commerce, services, tourism, buildings, transport, etc.

Regarding the information-promotion-awareness, the Regional Energy Centre of Crete acts as follows [5]:

Programming and implementation of continuous information-awareness campaigns for the citizens, the students, professionals, etc for adoption of environmental and energy awareness, for the implementation of innovative and new energy projects, etc.

- The local authorities in cooperation with the Region of Crete and its Regional Energy Agency and with the Ministry of Development have a decisive role to play in this field.

In addition to CRES and the Regional Energy Centres, other authorities that promote RES in the Greek islands are the following:

- The Organization for the Development of the Sitia Region in Crete Island. As indicative contribution of this organization, it should be mentioned that they have 0.5 MW installed wind capacity since 1993 and also they have a licence to install 1.2 MW wind power.
- Municipality of Mitilini, Lesvos Island. As indicative contribution of this organization, it should be mentioned that they have 800 kW installed wind power and 8 kW installed PV capacity. This municipality has granted authorization for additional 2.5MW wind power installation.
- Municipal Waste Water Treatment Plant with biogas production in Heraklion and Chania, Crete Island.

2.5 Non-Governmental Bodies

The non-Governmental bodies that promote RES are the following:

- Greenpeace
- WWF
- The Hellenic Network of Ecological Organizations. It consists of 4 local ecological organizations in Crete and 7 organizations on the rest Aegean islands [7].
- Unit for Renewable Energy Sources RENES of the National Technical University of Athens [8]
- The Greek Association of RES Electricity Producers [9]
- The Hellenic Association of Photovoltaics [10].

2.6 Policies and incentives for RES

Greece follows the feed-in tariff model, according to Greek laws 2244/1994 and 2773/1999.

The financing of RES installations in Greece is implemented through the 3rd Community Operational Framework Programme “Competitiveness” of the Ministry of Development of Greece [11]. The secretariat for competitiveness is in charge of this programme.

More specifically, within the 3rd Community Operational Framework Programme "Competitiveness", Measures 2.1 and 6.3 of Axes 2 and 6, respectively, are the ones that are related to RES installations.

Measure 2.1 is entitled "Aid for investment in co-production, renewable energy sources (RES) and energy saving systems". The objectives of measure 2.1 are:

- Diversification of energy sources and reduction of the dependence on imported energy sources
- Decrease of operating cost in industrial and public services sector
- Environmental protection via the reduction of fuel consumption in order to comply with the Kyoto Commitment protocol.
- Support local development via RES installation. Increase of local employment at the RES installation sites

The research priorities of measure 2.1 are:

- Information, support and promotion of CHP, RES and RUE measures.
- Expansion of infrastructure in CHP, RES and RUE
- Financial incentives for private investments in RES
- Investment in RUE from Public sector, like Schools, Hospitals etc. These investments may consist of:
- Replacement of conventional fuels infrastructure with Natural gas,
- Energy efficiency measures,
- RES and CHP installations,
- PV installations on public buildings of Greek islands.

Measure 6.3 is entitled "Special energy infrastructures for islands and for the promotion of renewable energy sources (RES)".

The measure 6.3 aims at the improvement of quality and reliability of electricity supply at the island regions covering their energy needs with innovative solutions joint with their other needs such as water. Moreover, it aims at the promotion of RES investments in regions where despite their high potential, the existing system of transport requires aid or/and the network of distribution requires reinforcement or extension. Therefore these actions aim at:

- Meeting the very rapidly increasing demand of electric energy and in the islands and solve problems of fluctuations of voltage and frequency
- Helping RES installation on islands, aiming at the decentralized electricity production to stimulate local economy
- Network expansion so that RES at regions with high wind potential can be installed.

The research priorities of measure 6.3 are:

- Interconnection of island systems either at High or with Medium voltage sub sea cables in order to increase Wind power installation and reduce diesel oil consumption
- Novel solutions of energy supply of islands facing at the same time water supply needs or/and waste water treatment
- Emphasis on applications of geothermal energy and co-generation.
- Reinforcement of distribution systems on islands so that RES and co-generation facilities can be built

- Reinforcement of the Hellenic Transmission system so that RES projects can be installed within a specified time schedule.

The financing of RES installations in Greece is as follows:

- Wind Energy: 30% of the budget
- PV: 50% of the budget
- Geothermal: 50% of the budget
- Biomass: 50% of the budget
- Energy saving programmes: 40% of the budget
- CHP: 35% of the budget

It should be noted that companies operating on Greek islands with population under 3100 inhabitants have tax reduction. In addition, there is a new call for installing PVs on public buildings of islands (with population under 3100 inhabitants) with almost 100% subsidy.

2.7 Analysis of economic incentives

2.7.1 Pay back of Wind Park Installations

Table 1 presents the pay back of wind park installations in Crete. For the calculations in Table 1, the following elements were used:

- 7.5% pay back interest rate (EWEA) [12]
- The production and the tariff for each year of the installation for the wind park
- The worst production year for the wind park
- Constant value for wind production compensation (81.5 €/MWh)
- 531000 €/600 kW wind turbine installation cost [13]
- For parks with available (published) economic data, these economic data were used.

It can be concluded from Table 2.1 that the subsidy helps in having pay back in less than 6.5 years. For the wind parks of PPC, similar results are foreseen, although it is probable that the pay back is even shorter due to the fuel consumption reduction that is higher than the income for the wind producers.

Table 2.1: Pay back of investments for wind parks in Crete Island.

Wind farm name	Installed Capacity (MW)	Production start	Pay back (years)	
			With Subsidy	Without Subsidy
ROKAS	10.20	May 1998	3.3	4.3
AIOLOS	9.90	May 1999	4.9	6.1
IWECO	4.95	May 1999	4.9	6.1
MARONIA	25.00	December 1999	5.3	7.8
WRE	2.40	August 2003	6.2	9.5
PLASTIKA	5.94	June 2003	2.6	3.6

2.7.2 Economic and Environmental Impact of Wind Production in Crete

For the economic assessment of the wind power production in Crete, the actual cost of the fuel consumed for the operation of the system during 2000 including the compensation of the wind power producers is compared to the cost obtained if the thermal units alone would cover the same load. It is not considered any effect wind power might have on personnel, capital and management costs, interests, etc.

Comparison between the actual cost of operation including the compensation of wind power producers and the cost of purely thermal operation under the same load and maintenance conditions, calculated optimally, is shown in Table 2.2.

Table 2.2: Comparison of actual operation cost versus cost of purely thermal operation for the year 2000.

	Heavy Oil (tn)	Diesel Oil (klt)	Cost (k€)
Actual	263,166.5	283,303	178,505.6
Purely thermal	269,014.3	324,499	181,099.3
Difference	5,847.76	41,196	2,593.7
Percentage savings	2.22%	14.54%	1.45%

It can be seen from Table 2.2 that in 2000 annual savings of 1.45% are obtained amounting to a total cost of 2.6 Million €. It should be noted that these costs do not include the costs incurred in the system by possible intentional load shedding due to security reasons. For example, with the current thermal installed capacity, if the Wind Parks were not installed, the unserved energy would reach 11.6 MWh in the periods (24/10/2000 at 13:05-13:20) and (10/12/2000 at 17:50-19:40) with a maximum load shed of 8.1 MW for 5 minutes. The evaluation of this cost is very complex and can include compensation by the Utility imposed by regulatory measures, special reliability tariffs, etc. A related issue is the economic gains obtained by the postponement of capital investments for the installation of new thermal units or the construction of new thermal stations, in order to maintain a satisfactory degree of reliability in order to cover the load.

Table 2.3: Annual (2000) reduction of pollutants due to wind power production.

	Tn	%
Pollutant Particles	60.07	7.27
SO_2	368.49	2.41
NO_X	260.7	6.03
CO_2	119,42	7.78

Moreover, it is interesting to calculate the environmental benefits from the wind power penetration in the energy production of the Crete power system in 2000. These benefits are summarized in Table 2.3. In view of the EU commitments to reduce Greenhouse Gas

Emissions and other pollutants in the near future, the above effect alone would possibly justify support for a wide exploitation of wind power resources in isolated, island systems and other regions in Europe.

2.8 Recommendations

The following recommendations are proposed for the promotion of renewable energy sources in Greek islands:

- There is a need for speeding up authorization procedures
- Simplification of the procedure for granting authorization especially for small investors
- The licence procedure should be differentiated according to the RES type of installation
- Effective co-operation of the local authorities with the investors
- Creation of new regional energy centres and increasing the financing of the existing regional energy centers.

2.9 Conclusions

This paper presents the promotion mechanisms of renewable energy sources in Greek islands. The Greek laws 2244/1994 and 2773/1999 are the driving forces for RES promotion. The Regional Energy Centres and CRES have an important role in the promotion of RES. The incentives for RES in combination with the renewable resource potential are crucial factors for the competitive pay back of RES investments.

2.10 References

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/4/ Centre for Renewable Energy Sources (CRES), URL: http://www.cres.gr/.

/5/ Regional Energy Centre of Crete, URL: http://www.creteregion.gr/.

/6/ Regional Energy Centre of North Aegean, URL: http://www.northaegean.gr/.

/7/ Hellenic Network of Ecological Organizations, URL: http://www.eco-net.gr/.

/8/ Unit for Renewable Energy Sources RENES of the National Technical University of Athens, URL: http://www.ntua.gr/renes/rensgrk/.

/9/ The Greek Association of RES Electricity Producers, URL: http://www.hellasres.gr/.

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3 Overview and Recommendations for RES Policies in Croatia Based on the Australian Experience

dr.sc. Maja Božičević Vrhovčak
Vesna Bukarica
doc.dr.sc. Željko Tomšić
Dražen Jakšić
Robert Pašičko
Faculty of Electrical Engineering and Computing, University of Zagreb
Unska 3, 10000, Zagreb, Croatia
Phone: +385 1 6129-986, FAX: +385 1 612-9890, e-mail: maja.bozicevic@fer.hr

3.1 Abstract

The Australian experience in a wider introduction of renewable energy sources has been described. The so-called Minimal Renewable Energy Targets has been thoroughly presented, because of the similarity to the model proposed in Croatia and as a role model how a comprehensive state-level approach to the issue of renewable energy should be conducted.

3.2 Current situation

Renewable energy use in Croatia currently makes about 16% of the total primary energy consumed, which in 2003 equalled about 400 PJ. The largest share of renewable energy is produced in large hydro power plants, about 12%, and by traditional use of biomass – fuel wood, about 4%. Biomass used for energy transformations makes only about 0,6% of the total primary energy used for transformations [0].

Apart from the large hydro electric power plants, the largest number of existing renewable electric facilities are small hydro plants. There are 15 small hydro plants in operation, the oldest of which originates from 1904. The majority is being owned by the Croatian electric utility (HEP), 3 are privately owned and 2 are owned by the industry.

According to the official statistics, solar energy is currently not used. However, there is a number of solar heat collectors installed along the Adriatic coast but there is no official monitoring and the reported level of use is under the actual level. Apart from the thermal applications, solar energy is also used for small-scale electricity production, primarily for GSM base stations, light-houses emergency equipment and parking machine. To the knowledge of the author solar PV facilities have been installed on two family houses – one in Zagreb with 7,14 kW and the other in Čakovec with 5,6 kW of peak power. As there is no system of reporting or monitoring, the reported level of solar energy use for electricity production also equals to zero.

Biomass has an important role in the primary energy consumption but only as traditional use of fuel wood. Apart from this, there are few CHP plants within wood industry, two small

biogas plants and numerous industrial heating plants, but no district heating so far. Biodiesel production has also been planned.

Geothermal energy is being used for water and space heating in several recreational and health objects.

The largest interest currently is in wind energy use for electricity production. There is only one wind power plant in operation – a 6 MW wind park at the island of Pag for which a power purchase agreement has been signed by the investor and the Croatian electric utility (HEP). A similar agreement has been signed for a wind power plant Krtolin near Šibenik which is yet to be constructed with a planned capacity of 5 MW as well as a wind power plant near Obrovac with a capacity of about 10 MW.

The barriers regarding the RES development in Croatia are similar to the barriers RES are facing in other countries - primarily high up-front investment and uncertainties connected to the energy system liberalisation. Another important barrier is the needed cross-sectoral approach which is difficult to accomplish because renewable energy sources are a part of different strategies, laws and ministries.

Apart from these obstacles, financing mechanisms for use of renewable energy sources are missing in Croatia. Until recently only commercial loans were at disposal and it remains to be seen whether the Fund for Environment Protection and Energy Efficiency will act according to its work plan.

Further, an important barrier to the development of RES in Croatia is the lack of secondary legislation. The Energy Law which has entered into force in 2001 specifically stipulated that the Rules on renewable energy sources will be adopted by the Ministry of Economy within six month after the adoption of the Law. Unfortunately, this has never happened. The Energy Law has in the mean time been amended (December 2004) and the same time frame has been set for supplementing by-laws necessary for a wider RES penetration. At the moment of writing of this article (October 2005), the secondary legislation has not been passed yet. Obviously the set time frame has not been fulfilled and it is not clear when will the legislation be adopted.

It will be only after these preconditions – favourable financing opportunities and legislative framework – have been met that other barriers for a successful RES penetration will come into focus, such as legal framework complexity, necessary grid expansions or public resistance.

3.3 Future use of RES

Future use of RES will most probably be set by the targets to be negotiated with the EU. Namely, Croatia is currently an EU candidate country. Within the negotiations prior to becoming a member country, targets for renewable energy use will have to be set.

Currently, renewables for electricity production are being given more attention and two different targets are being considered: 4,5% of the total electricity consumption in 2010 or, more recently, 6% of the total consumption.

The Croatian government's position is that energy sector should be able to finance itself, therefore no direct investments in renewables from the state budget are probable. There are two main sources for renewable energy sources funding.

For grid connected electric facilities powered by the new renewables, an additional surcharge has been proposed: the sale of the entire electricity production to the national grid is guaranteed and the price consists of the average price of kilowatt-hour plus the surcharge, depending on the renewable source used. The rules on tariffs for renewable electricity is currently under preparation and the financial resources will be collected through an additional surcharge per kWh consumed (proposed amount is 0,41 lp/kWh, which is around 0.06 €c/kWh). Investments in isolated facilities, both electric and thermal, will be supported by the Fund for environment protection and energy efficiency.

However, the prevailing opinion of Croatian decision makers is that the share of renewables in Croatia is already very high (around 50% in electricity production) and that necessary investments in new renewables i.e. support mechanisms for energy produced are too expensive for Croatian circumstances. Therefore the predicted rise in share of renewables in electricity and energy production will be primarily a consequence of international obligations with no particular drive stemming from the inside of the Croatian energy sector.

Renewable energy sources deployment mechanisms can be broadly divided into two groups – mandatory and voluntary mechanisms. Mandatory mechanisms are based on the position that renewable energy sources use is of common interest and that all energy consumers must share the increased costs of energy due to a wider RES adoption. The best example of this approach is the feed-in system in Germany: all electricity consumers are obliged to pay additional costs of electricity consumption. The resources are collected by a central body and distributed to renewable electricity producers.

Another possibility is to set up a voluntary scheme, to allow citizens to choose whether to pay additional costs for electricity produced from renewables. For this approach a guarantee of origin is a necessary precondition, as well as a high level of consciousness in general public.

A voluntary scheme will most probably have a modest impact on new renewables installations in Croatia – the average education level is quite low (only about 8% of population with a university degree) as well as conciousness regarding environmental issues. Environmental issues are gaining an increasing attention, primarily due to environmental organizations, but there is an even more aggravating issue – the majority of people living standards is above that allowed by their incomes and they are most probably not willing to pay additional fees for electricity, even if it is produced with less environmental impacts. However, to reach a final conclusion a thorough market research should be conducted.

For these reasons a mandatory scheme has been proposed and it is currently in the legal procedure. However, the additional costs imposed to Croatian citizens must be kept as low as possible (current proposal is about 0,06 €c/kWh).

The government position is that the state budget has already been made very tight and that resources for the energy sector must be extracted from the energy sector itself, which means that no state investments or funding is possible (apart from the Fund for environment protection and energy efficiency, which is not a part of the state budget, financed by the fees paid by all polluters and users of the environment).

However, there is a field in which renewables can be of significant importance for Croatia: the climate change issues. Namely, Croatia will experience serious difficulties in fulfilling the requirements of the Kyoto Protocol. Croatian obligation regarding the Kyoto Protocol is a

reduction of CO_2 emissions by 5% relative to the 1990 level. However, current CO_2 emissions are approximately at the same level as in 1990, which has been chosen as a base year for future reductions. Croatian representatives are currently trying to negotiate a certain level of flexibility regarding the base level of emissions, but it cannot be expected that the degree of flexibility (even if negotiated out) will be substantial.

The international experience in including renewables in CO_2 emission reduction which could be very valuable for Croatia is the Australian case.

3.4 The Australian Experience in implementing RES in the climate change strategy

Energy use is the dominant source of greenhouse gas emissions in Australia, contributing 68% in to the nation's total emissions. The Australian Greenhouse Office is implementing a range of programmes designed to reduce emissions from the energy sector.

The Government's climate change strategy is centred on five key areas – emissions management; international engagement; strategic policy support; impacts and adaptation; and science and measurement. Major initiatives include:

- boosting renewable energy actions and pursuing greater energy efficiency,
- investing significant resources into greenhouse research and monitoring Australia's progress towards its Kyoto target through the National Greenhouse Gas Inventory,
- studying the landscape of Australia through the National Carbon Accounting System,
- encouraging the development and commercialisation of low emissions technologies,
- encouraging industry, business and the community to use less greenhouse intensive transport,
- fostering sustainable land management practices.

Regarding the renewable energy issues, the mandatory target for an additional 9,500 GWh of electricity to be produced from renewable sources by the year 2010 has been set in the year 2000 and reconfirmed in 2004. According to projections, this will make about 2% of total electricity consumption. The target has been set by the Renewables Target Working Group, established to investigate possible implementation mechanisms for the 2% target.

The Renewables Target Working Group is a technical group established by the Greenhouse Energy Group in early 1998 to develop proposals for implementing the measure by the year 2000. The Greenhouse Energy Group is a part of the Australian Greenhouse Office, which is a part of the Department of the Environment and Heritage. It is interesting to note that the establishment of the Australian Greenhouse Office was announced in the Prime Minister's statement "Safeguarding the Future: Australia's Response to Climate Change", published just before the Kyoto Conference on climate change in late 1997. The Greenhouse Office has been established in 1998 and already in 1999 the Renewables Target Working Group finalised its report entitled "Implementation Planning for Mandatory Targets for the Uptake of Renewable Energy in Power Supplies" [0].

3.5 Development of the Minimum Renewable Energy Target measure

In 1997, prior to the announcement of minimum renewable energy target (MRET), Australia's renewable energy sector generated around 16 000 GWh of electricity, equating to around 10.5 per cent of Australia's electricity market. The vast majority of this renewable electricity was generated from hydro-electric sources. Minor renewable sources contributing to this generation included landfill gas, biomass, photovoltaic and wind. To put the level of additional generation mandated by the MRET measure into perspective, the 9500 GWh of additional renewable generation required by 2010 under MRET, represents around a 60 per cent increase in renewable generation above 1997 levels.

The working group has identified three major goals of the set target:

- to accelerate the uptake of renewable energy in grid-based applications, so as to reduce greenhouse gas emissions;
- as part of the broader strategic package to stimulate renewables, to provide an ongoing base for the development of commercially competitive renewable energy;
- to contribute to the development of internationally competitive industries which could participate effectively in the international energy market.

Given that the measure has multiple objectives, the work group has stated that it RES promotion is not a least cost greenhouse abatement measure. It has recognised that the measure may involve net economic costs in the short- to medium-term and hence go beyond a no-regrets approach.

One of the key recommendations is that the measure should be gradually introduced, by way of a series of phased interim targets, and that the phase-in path should be designed to result in cost-effective implementation and maximum opportunity for the domestic renewable energy industry to respond to the measure.

Sources proposed to be eligible under the measure (where used for electricity generation, or in the case of solar hot water, where displacing electricity) are solar, wind, ocean, wave and tidal, hydro, geothermal, biofuels (landfill gas, biogas, biomass), specified waste, solar water heating (when displacing electricity) and cofiring with renewables. Specified wastes include:

- biomass by-products of agricultural crops but excluding broad-scale land-clearing for agricultural purposes;
- biomass by-products of sustainably managed forestry operations;
- biomass by-products of food processing and production industries;
- sewage treatment;
- biomass component of mixed municipal wastes;
- other biomass wastes as approved by the regulator.

The phasing approach has been accepted and interim target levels for every year of the period have been given, as well as required additional gigawatt-hours. The starting point for renewables has been determined based on the 1996/7 reports and the phasing path chosen took account of a possible reduction in the contribution of renewables to total electricity production between 1997 and commencement due to the fact that renewables generation will grow at a slower rate than fossil fuel generation, causing the share of renewables as a

proportion of total generation to be reduced between the baseline year and the introduction of the measure.

Portfolio approach i.e. meeting the target with various RES technologies has been considered and it has not been recommended because of the significant additional cost of meeting the target with non-least cost investments.

Solar water heaters have also been included in the measure in case they displace electricity. To avoid the need for site specific assessments of the amount of energy displaced, a range of displacement factors have been developed for a number of different types of solar water heaters in different geographic regions. A home owner purchasing and installing a solar water heater may assign, to a liable party, the right to claim renewable energy certificates equivalent to the total amount of the electricity displaced by the solar water heater towards their liability.

Tradeable Renewable Energy Certificates (RECs) are created on the basis of eligible renewable energy generation with each REC equivalent to one megawatt hour (MWh) of renewable generation.

As one of the objectives of the 2% target, the working group has defined the development of Australia's renewable energy industry. The concern was that if the measure simply focuses on increasing the level of renewables in electricity supply, and is not implemented in a way that fosters the development of domestic capacity, there could be less benefit to Australian industry.

Without specific support for the Australian renewable energy industry, a large proportion of the required investment would be sourced from abroad, in which case it would be likely that overseas experiences in implementing renewable energy policies would be repeated and that the local industry would not benefit from the measure in any way. It was noted that while access to a range of renewable energy technologies presents benefits, it is not necessary or even desirable for Australia to develop domestic capacity in each. Therefore, it was concluded that a focus on specific technologies in which Australia has competitive advantages would be the most beneficial. Special attention has been given to balance the concern for domestic industry with the World Trade Organization requirements.

Phasing represents a gradual introduction of the target over the period to 2010. The Working Group has agreed, to ensure that the measure is able to be met, that a series of interim targets should be established throughout the operation of the measure. There would be significant dangers to the achievement of the target if only the 2010 level of renewables purchases is enforced. Additionally, if there are no legally enforceable interim targets, it would be likely that liable parties would delay investment in renewables until 2010 and the required generation capacity would not be available, or would need to be imported from overseas, possibly at a great expense. Further, by gradually increasing renewables capacity over time, it is expected that the Australian renewable energy industry would be best able to respond to increasing demand.

A thorough investigation of the so-called portfolio approach has been conducted. The portfolio approach means that various renewable technologies have their guaranteed share within the 2% target. Through series of discussions and workshops pros and cons the portfolio approach have been identified. A portfolio response would ensure that a broad range of renewable energy technologies contribute to achieving the target, not just those currently able to

compete with retail prices of fossil fuel generated electricity. It would also allow more expensive technologies to benefit from the growing renewables market in the short term, potentially facilitating a reduction in generation costs due to accelerated innovation and economies of scale. Denying these technologies the opportunity to secure a guaranteed market in the short term may rule out potential to achieve future cost reductions, thereby severely reducing a technology's ability to strongly participate in a competitive energy market.

On the other hand, arguments opposing the portfolio approach related to the increased cost and complexity of the measure which would be a result of a portfolio. As the 2% measure is already an interventionist approach to achieving greenhouse gas reductions, it can be argued that, within that approach, the market should be allowed as much freedom as possible to determine its own response. There is also a concern that a portfolio approach would be seen to be picking winners. Additionally, there is no assurance that a portfolio approach will guarantee that the Australian renewable energy industry will be a key beneficiary or able to respond to the demands of the portfolio. There is concern that the additional cost burden of increased electricity prices placed on consumers will not lead to a stronger Australian manufacturing base.

Much concern has been given to photovoltaic technology, currently well developed in Australia but still too expensive. However, the analyses have shown that a 10% PV portfolio will only increase the level of Australian content, compared to other response scenarios, by around 6 per cent. Therefore, the Working Group recommended that a portfolio approach is not to be instituted.

Several Australian institutions consortium was commissioned in November 1998 to undertake a detailed assessment of the capacity of Australia's renewable energy industry to respond to the 2% target. This study covers an assessment of each of the proposed eligible renewable energy resources, as specified by the Working Group, and the likely responses of these resources to the opportunities provided by the 2% target [0].

The report indicates that a large majority of the eligible resources are currently at a commercially competitive or pre-commercially competitive stage in the Australian context and would be able to respond to meet the target, given the right investment signals.

The study assesses the likely resource/technology mix which would occur under various implementation scenarios. Under each of these implementation scenarios, and given the report's assessments of the maximum available installable capacity for a resource/technology combination in a particular period, a number of scenarios for least cost methods of meeting the target were constructed. From these assessments there were several conclusions:

- the additional cost, in energy generation terms, directly attributable to the 2% target is estimated to be between $100 m (60 million €) and $250m (150 million €) in 2010;
- the Australian content of the technology used to meet the target will be between 75% and 85% under every scenario;
- the investment cost of the measure is estimated to be as low as $1.8 billion (1.1 billion €) spread over the period until 2010, under a least cost dual slope linear implementation strategy (interrim targets being linearly increased in the first period at a lower rate and in the second period at a higher rate);
- exponential phase-in paths were less expensive in terms of investment costs and purchased energy costs than linear phase-in paths;

- scenarios that contained a portfolio were substantially more expensive than those without;
- biomass (most notably cogeneration) and solar hot water made the greatest contribution to meeting the target under this cost based modelling.

This analysis provided the foundation for an analysis of the macro-economic and broad sectoral economic impacts of the measure, which was commissioned in January 1999 [0]. The MM2 model, a dynamic, macro-industry econometric model, was used to investigate the macro-economic effects of the extra investment required to achieve a projected level of electricity demand in 2010, while generating an additional 2% of that electricity from renewable sources. The MM303 model, a computable general equilibrium model, was used to provide sectoral detail on the impacts of the measure.

Both models indicated that the impact of the measure on the macro-economy were small - especially when compared to other fluctuations that occurred in the economy - and had little lasting effect. The modelling also indicated that the impacts on each of the sectors were small for the degree of detail permitted by this form of modelling. More specifically:

- GDP declines by around 0.06% lower than business as usual levels and is in the long run around 0.04% lower.
- Employment is unchanged in the long run. Through the period it fluctuates from periods of slight decline from the baseline (0.03%) to periods of slight increase above the baseline (0.02%).
- The exchange rate is slightly lower across the simulation period and remains slightly lower in the long run.
- Imports are lower across the period and remain slightly lower in the long run.
- Export levels are largely unchanged by the measure.
- Interest rates are higher than in the base case at the start of the period and then lower than in the base case at the end of the period. In the long term they are largely unchanged.
- Prices increase above the baseline peaking at 0.12% higher than the baseline level. Prices then decline back toward the baseline level. They are 0.06% higher, than they otherwise would be, in the long run.

The modelling results shows that the measure's most significant impacts are in those industries that are electricity intensive in production or where production is closely linked with electricity production. The exception to this is the electrical equipment and appliance manufacturing sector. This sector undergoes a net increase in production of around 0.12% due to the increase in production of solar water heaters as a direct result of the measure.

The sector projected to experience the greatest impact under the measure is the electricity supply industry. The impact of the 2% target has been modelled as an increase in the capital to output ratio in the electricity, gas and water sector, representing a decline in the efficiency of electricity generating capital. This subsequently produces an increase in the price of electricity as well as an increase in labour use within the industry, as there is a substitution to relatively more efficient labour (when compared to capital). The decline in production in the electricity supply industry is around 0.43%.

Although the modelled effects across aggregated industries were consistently small, macro models are not able to assess sectoral impacts in great detail. An assessment of these impacts was especially important in order to determine the likely impacts upon energy intensive sectors. A consulting company was engaged in January 1999 to investigate the effects of the measure on these energy intensive sectors [0].

The Working Group identified several industries for which a detailed sectoral analysis would be required. These included:

- electricity retailing;
- aluminium;
- mining and minerals;
- pulp and paper;
- plastics and chemicals;
- iron and steel;
- gas; and
- renewables.

Electricity retailing: The tight margins on electricity retailers due to the low market price suggest that the cost increases of electricity under the 2% target are likely to be passed on to customers, although the degree to which this will occur will depend on the degree of competition within particular market segments. The time at which these cost increases will occur may coincide with other upward pressures on electricity prices.

Gas: The 2% target has not been raised as an issue of significance by the members of the Australian Gas Association to its industry body. It is assumed that an increase in the cost of electricity relative to gas will lead to a substitution towards the use of gas.

Renewables industry: The impact of the measure will vary widely in this industry because of the breadth of technologies it encompasses. Assessments of the measure by industry participants vary from the mildly positive (solar hot water) to the negative (existing renewables generators). The opportunities for biomass are again indicated.

Impacts across other energy intensive sectors are not expected to be uniform. However, as electricity prices will rise, the measure will lead to increase in production costs which will either lead to increase in product prices or decrease in profits.

3.6 Subsequent Actions

In the year 2000, the Renewable Energy (Electricity) Act has been passed, based on the report by the Renewable Energy Working Group. It requires the generation of 9,500 gigawatt hours of extra renewable electricity per year by 2010. The Government's Mandatory Renewable Energy Target commenced on 1 April 2001. The Renewable Energy (Electricity) Regulations 2001 were gazetted on 6 February 2001. To oversee the implementation of the measure, the Office of the Renewable Energy Regulator has been established in February 2001.

The main responsibilities of the Office include:

- accrediting renewable energy generators to allow them to participate in the scheme;

- overseeing the creation of valid renewable energy certificates;
- assessing annual compliance statements;
- imposing any penalties for non-compliance with the provisions of the legislation;
- redeeming any renewable energy shortfall charges if shortfalls are made up within three years; and
- to ensure the integrity of the measure, undertaking audits of participants including renewable energy generators and liable parties.

3.7 Mandatory Renewable Energy Target Review

The Mandatory Renewable Energy Target, which was established by the Renewable Energy (Electricity) Act 2000 (the Act), commenced on 1 April 2001. Section 162 of the Act requires the Minister for the Environment and Heritage to conduct an independent review of the operation of the Act.

In 2002, the Minister for the Environment and Heritage announced the commencement of preparations for the independent review of the operation of the Act. To assist in determining of the scope of the review the Minister invited submissions from interested parties, including stakeholders in the renewable energy and the electricity sectors as well as environmental and community groups.

In January 2004 the Minister for the Environment and Heritage released the report of the Mandatory Renewable Energy Target Review [0].

The report has found that MRET had contributed significantly to additional renewable energy generation with 190 power stations accredited. Of these, 84 have been commissioned since MRET came into operation. MRET's interim targets for electricity generation during its first two years of operation have been exceeded with no evidence of significant shortfalls by liable parties.

The growth in renewable energy generation has primarily come from the hydro and solar hot water sectors, with strong growth in the wind sector coming from a small base. Generation from biomass has not been as significant as expected prior to the introduction of MRET. The measure has only had a marginal influence on generation from solar photovoltaics, and no RECs have been created from wood waste sourced from native forests.

Renewable energy industry sales have grown from around $1.1 billion (0.7 billion €) per annum prior to MRET to over $1.8 billion (1.1. billion €) during 2002–03, almost half way to the Renewable Energy Action Agenda target for 2010 of $4 billion (2.5 billion €). From a small base, exports have grown to more than $250 million (150 million €) in 2002–03. Estimates sourced from ORER suggest that more than $900 million (550 million €) worth of investment has taken place with more than $1 billion (600 million €) in the pipeline.

By 2007, sufficient capacity is expected to have been installed to meet the MRET target of 9500 GWh for 2010. As a consequence, investment is expected to fall away rapidly. A further reason advanced for the anticipated decline in investment is that most renewable projects require high levels of up-front capital investment and a minimum payback period of 15 years.

Under current MRET settings, RECs will be not be available beyond 2020, so that by 2007 the available payback period for investments will have fallen below the required threshold.

To date, MRET has made only a small contribution to greenhouse gas abatement, although this is expected to increase as interim targets rise towards 9500 GWh. By the time the Kyoto compliance period of 2008 to 2012 is reached, MRET can be expected to have contributed around 6.5 million tonnes (Mt) of carbon dioxide equivalent (CO_2-e) abatement per annum, or around 10% of total current projected abatement.

MRET is a relatively expensive abatement measure compared with a number of other Australian Government as well as some State and Territory government initiatives. In 2010, the cost of abatement to the economy arising from current MRET settings is expected to be about $32 (20 €)) per tonne CO_2-e.

MRET has contributed to employment growth in the renewable energy industry, especially in regional Australia where many renewable resources are located. At this stage of its development, employment in the industry is small but growing with just over 6000 direct employees.

Renewable energy generally, and MRET in particular, has broad community support, with survey evidence showing that many residential consumers are willing to pay more for electricity generated from renewable sources.

The Review Panel considers that a continuation of the current gradual buildup of the MRET target would stimulate progressive growth in the renewables industry and provide opportunities for innovative Australian companies to gain experience in the domestic market, providing a sound base for future exports. Such an approach would also provide useful preparation for the larger contribution renewables may make at a later date.

Under current settings, MRET will not achieve its industry development policy objectives. The anticipated stalling of investment from 2007 will prevent the orderly development of a renewable energy manufacturing industry, which requires steady growth in demand, not a boom and bust. Such an outcome would also lock Australia out of technological developments that could otherwise reduce the cost of renewable energy generation over the next decade. A major issue to be addressed is the flattening out of the MRET target after 2010, which is the main cause of the anticipated stalling in investment from 2007.

In developing refinements to MRET, the Review Panel's primary objective was to create a viable industry at minimum cost to the economy, while continuing to assist in the abatement of greenhouse gas emissions.

Therefore, the Review Panel recommended continuing steady increases in MRET interim targets towards a target of.20 000 GWh by 2020. Based on current electricity market estimates, an additional 20.000 GWh would approximate an additional 2% of overall demand in 2020 (from the 1997 baseline).

As stated already during the initial development of MRET, the Review Panel has again confirmed that the MRET is not the lowest cost approach to the reduction in greenhouse gas emissions, at least in the shorter term. The more economically efficient measures are abatement options such as fuel switching from coal to gas-fired generation, end-use efficiency and further reductions in land-clearing. However, while these least cost abatement options can be pursued, more expensive options may need to be taken up if higher emissions abatement

targets are established beyond 2012. The next round of abatement from fossil fuels may involve new clean coal technologies and measures such as geological sequestration. Depending on the cost of such future technologies, renewable energy may provide an attractive alternative. In many ways MRET needs to be seen as an insurance against a time when renewable technologies become competitive with other electricity generation, thereby allowing Australia to be well down the learning curve and thus be an active participant in what is likely to be a large international industry.

3.7.1 National Energy Market

One of the benefits of MRET is the experience that is being gained by National Electricity Market Management Company (NEMMCO), which operates the NEM, in the issues arising from the integration of renewable energy, with its particular characteristics, into the NEM. For example, NEMMCO commissioned a report entitled Intermittent Generation in the National Electricity Market, which was released in 2003. The report identified a number of issues confronting the NEM as it accepts higher levels of intermittent generation from renewable sources such as wind.

The NEM would be better able to cope with intermittent generation from wind if there was a greater understanding of wind patterns, and more effective geographic planning of wind generation sites. A NEM-wide strategic view would allow greater capacity to investigate and capture these benefits. The lack of a comprehensive wind mapping database remains a significant barrier to industry development, and impedes resolution of outstanding NEM management risks and electricity market confidence. The lack of nationwide data also holds back research to support increased wind development within the NEM and effective long term planning.

3.7.2 Industry Policy Considerations

The flagship industry policy related to the renewable energy industry is the Renewable Energy Action Agenda. Action agendas are partnerships between the Australian Government and industry, with the primary focus of increasing the growth prospects of an industry sector by identifying the steps needed to develop and enhance the sector's sustainable competitive advantages. Similar agendas have been developed for 29 sectors.

The industry's key vision, as described in the Action Agenda, is 'to achieve a sustainable and internationally competitive renewable energy industry which has annual sales of $4 billion (2.5 million €) by 2010'. Implicit in the adoption of this target was that the achievement of the target would require a decade of strong growth equivalent to 25% per annum and about half of the overall sales target being met from exports.

The Action Agenda vision adopts five key strategies:

- market development,
- building community commitment,
- building industry capability,

- setting the policy framework,
- encouraging a culture of innovation.

The final strategy, 'Encouraging a culture of innovation,' has led to the release of the Renewable Energy Technology Roadmap, an integral part of the Action Agenda and therefore an important contributor to the competitiveness of the industry. The Roadmap identifies R&D priorities for the industry.

It has been concluded that the success of the Action Agenda is critically dependent upon MRET. MRET effectively provides a subsidy to renewable energy generators, but the size of this subsidy is in part affected by market factors. That is, renewable energy generators are able to trade RECs with liable parties, with the REC price set by the terms of this trade. This price measures the extent of the subsidy to the renewable energy industry.

To give an indication of the variability of renewable energy certificate prices, the Review Panel became aware of prices for solar hot water RECs as low as $16 (10 €), while at the other end of the scale BP Solar has offered to pay a rebate amounting to $80 (50 €) per REC to customers purchasing its photovoltaic (PV) systems. On average, though, current REC prices are widely accepted as approximately $37 (23 €). As a result, in dollar terms, the implicit MRET subsidy is about $37 (23 €) per MWh.

This subsidy can be compared with the average pool prices paid for electricity. In its submission, the Electricity Supply Association of Australia stated that 'over 12 months to date, volume weighted pool prices averaged $45 (28 €) per MWh in New South Wales, $34 (214 €) per MWh in Victoria and $49 (30 €) per MWh in Queensland'.

3.7.3 Refining the MRET

One of the recommendations of the Review Panel is that any future target should continue to be expressed in terms of a fixed GWh level. By their nature, projections of electricity demand contain a degree of uncertainty. The changes in projected electricity demand that have occurred since MRET was announced demonstrate that a percentage-based target would require the corresponding generation level to be regularly revised. This would adversely impact on market certainty. Therefore, the Panel recommends the interim targets prior to 2010 and the 9500 GWh target for 2010 to remain unchanged.

On the other hand, the Review Panel considers that there is a strong case for an increase in the target post-2010. Such an approach would help maintain the momentum created by the first decade of MRET without adversely affecting electricity users in the short term. Setting a new target inherently involves some degree of subjectivity and judgment. On balance, the Review Panel believes that steady progress towards a target of 20 000 GWh in 2020 will:

- Maintain the momentum established by the 9500 GWh target and provide ongoing certainty and industry development opportunities to the renewables industry.
- Provide a minimum critical mass of investment needed to enable the industry to demonstrate its commercial viability, including the possible domestic manufacture of components for renewable energy projects.
- Provide a domestic demand base to allow the development of further export markets.

- Provide a more managed investment framework that will promote cost effective technology improvements and industry learning.

The end date of the measure is recommended to be extended beyond 2020 so that renewable energy from projects commencing after 2005 receive RECs for a full 15 year period.

To illustrate the broadness of the analysis, it is important to mention that the Panel recommends that a review of the Act should be initiated by the Minister if a decision is taken to implement a defined, economy-wide carbon penalty, or in the event of more than 15 per cent of the overall liabilities being met by shortfall charge payments over two consecutive years.

3.8 Other support mechanisms for renewable energy

In Australia, more than $A 300 million (around 185 million €) is available in grants to encourage the deployment of existing renewable technologies, the commercialisation of innovative new technologies and industry capacity building.

3.8.1 Solar Cities

Solar Cities is a $75.3 million (46,5 million €) initiative announced by the Prime Minister in the Energy White Paper, Securing Australia's Energy Future, in June 2004. Solar Cities will showcase a new energy scenario, where the uptake of solar power and energy efficiency measures by households and business and innovative approaches to energy markets will give effective signals to energy users that they can contribute to Australia's sustainable energy future. Solar Cities will be implemented by the Australian Greenhouse Office through trials in Adelaide and at least three other electricity grid-connected urban areas around Australia.

The aim is to demonstrate the economic and environmental costs and benefits of the mass installation of solar energy technology, energy efficient measures and smart meters on electricity supply and demand profiles and infrastructure needs. Through the Solar Cities trials, barriers to solar generation and demand side participation in grid-connected urban areas will be addressed. A key consideration will be to appropriately price and value these technologies and demand side measures in the evolving energy markets to support their commercial uptake.

3.8.2 Photovoltaic Rebate Programme

Under the Photovoltaic Rebate Programme (PVRP), which commenced on 1 January 2000, cash rebates are available to householders and owners of community use buildings who install grid-connected or stand-alone photovoltaic systems.

The rebate level for new systems is currently $4 (2,5 €) per peak watt, capped at $4.000 (2.500 €) per residential system and $8000 (5.000 €) per Community Building system. The rebate level for upgrades to existing systems is $2.50 (1,5 €) per peak watt capped at $2,500 (1.500 €).

The programme recently received an extension for a further two years, with additional funding of $11.4 million (7 million €). As part of the extension, the programme guidelines will be reviewed.

3.8.3 Renewable Remote Power Generation Programme

In those areas of Australia not serviced by a main electricity grid, electricity generated from renewable sources is often an effective way of reducing reliance on fossil fuel for electricity generation. The Renewable Remote Power Generation Programme (RRPGP) provides rebates for the installation of renewable generation equipment in remote parts of the country that presently rely on fossil fuel for electricity generation. Increasing the uptake of renewable energy technologies in remote areas of Australia will:

- help in providing an effective electricity supply to remote users
- assist the development of the Australian renewable energy industry
- help meet the energy infrastructure needs of indigenous communities
- lead to long term greenhouse gas reductions.

Over $200 million (123 million €) is expected to be available over the life of the RRPGP. Funding is available through either approved State or Territory projects or programmes administered by participating States or Territories, or through National projects approved and administered by the Australian Greenhouse Office, in the Department of the Environment and Heritage.

In 2004, the Australian government has extended the deadline for expenditures of funds to 2012.

3.8.4 (REEF)

REEF can provide venture capital for small innovative renewable energy companies. This includes companies which are commercialising direct or enabling renewable energy technologies and services, such as manufacturers of photovoltaic cells or the inverters to convert this to useful electricity, providing there is an innovative development being commercialised.

Approximately A$18 million (11 million €) of the available funding is provided under the Australian Greenhouse Office's REEF licence and approximately A$8.5 million (5,3 million €) is from private sources.

3.8.5 Low Emissions Technology and Abatement

The Low Emissions Technology and Abatement (LETA) programme was announced by the Australian Government in the 2004 budget as a $26.9 million (16,6 million €) measure designed to encourage technologies that reduce energy demand and emission intensity in the electricity sector, as well as in business, industry and at the community level.

LETA supports projects in four areas:

- Strategic Abatement - further local government engagement with households and communities
- Renewables - local deployment, industry development and export of renewable energy technologies

- Fossil Fuels - increased energy efficiency for electricity generators
- Geosequestration - pilot project to demonstrate enhanced monitoring and verification technologies for geosequestration sites in Australia.

3.8.6 Renewable Energy Industry Development Programme (REID)

REID supports the growth of the Australian renewable energy industry. The main programme activity has been the provision of competitive grant funding rounds to Australian companies who could demonstrate that their projects would assist the wider development of the Australian renewable energy industry rather than focus on a single enterprise.

Grown from the Industry Development Component of the Renewable Energy Commercialisation Programme, REID had funding of $6 million (3,7 million €). Three REID funding rounds were undertaken along with a small number of direct grants.

3.8.7 Renewable Energy Commercialisation Programme (RECP)

Under the RECP there were 6 rounds of Commercialisation and 2 rounds of the Industry Development component. RECP (Commercialisation) Rounds 1 to 6 provided funding between $100,000 and $1 million (61.800 to 618.000 €) to support competitively selected projects which demonstrated strong commercialisation potential; contribution to the wider development and diversification of Australia's renewable energy industry, domestically and/or internationally; and reduction of greenhouse gas emissions.

3.9 Conclusion

A wider adoption of renewable energy sources is likely to encounter numerous barriers and obstacles. One of the most important barriers is a high up-front investment of renewables and a lack of stable investment conditions. In Croatia, the share of renewables is already very high, but due to the international obligations, this share is expected to rise. Because of the already high share of renewables and higher costs of new renewables, here is no strong support to developing new renewables within the Croatian energy sector.

However, there is a rising concern about greenhouse gases emissions. Namely, Croatia has signed but not yet ratified the Kyoto Protocol. The ratification is being postponed because of the difficulties Croatia will have in fulfilling the requirements of the Protocol. Namely, the base year according to which future reductions will be set is 1990 and in 2005 the CO_2 emissions have already reached the 1990 level. Ratification of the Protocol is one of the preconditions to joining the EU which is probably the most important Croatian goal in the field of foreign affairs.

Croatia has submitted a number of requests to the IPCC and negotiations are under way. There is a possibility that a certain level of flexibility will be negotiated, however, the problem of future CO_2 emissions will only be postponed but still present.

In this view, the policy regarding renewables can be more attractive. The Australian example shows how a well developed expert analysis should be structured and conducted.

As a reaction to the Kyoto Protocol and, more general, to the global climate changes threat, the Australia Government has set up the Australian Greenhouse Office. Several initiatives for the climate change strategy have been identified, a wider use of renewable energy among others. To investigate the possibilities of a wider adoption of renewables, the Renewables Target Working Group has been established. After thorough analyses, the Minimum Renewable Energy Target measure has been introduced in 2000, by the Renewable Energy (Electricity) Act adoption. To oversee the implementation of the measure, the Office of the Renewable Energy Regulator has been established in 2001. Already in 2002 preparations for the independent review of the operation of the Act. The independent review panel has re-confirmed the MRET goals and given its recommendations for the period until 2020.

There are several recommendations applicable to the Croatian situation:

- Australian example of fostering indigenous industry is a valuable example for other countries with underdeveloped industry such as Croatia, especially in the field of renewables.
- The development of a competitive national renewable industry is an important goal of MRET, justifying the use of RES in the climate change strategy, as they go beyond no regret measures. Unfortunately, if the proposed goal for Croatia shall not be revised, the time frame will not leave enough space for domestic industry to respond.
- After an in-depth analysis, the Working Group recommended that a portfolio approach is not to be instituted. On the contrary, in Croatia the porfolio approach has been adopted, primarily out of concern that the set target will be achieved solely by electricity production in wind power plants. An often repeated argument against wind power plants is that they will have adverse impact on the power system operation, however no thorough investigation of this issue has been conducted.
- It has been recommended that future renewable energy targets be given as the quantity of electricity produced and not as the percent of future electricity consumption, because any such predictions are linked to high degree of uncertainty. However, the goal currently considered by the Croatian government is stated as a percentage of future consumption, adding more uncertainty into an already uncertain situation.

The Australian expenditures for renewable energy support are high and beyond Croatian capabilities. However, it can be seen that the proposed legislation has a number of drawbacks which could be rectified at a minimum cost. The precondition is a well structured approach including a large number of different stakeholders interested in renewable energy.

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4 RES Promotion Mechanisms in Macedonia

Vlastimir Glamočanin
Faculty of Electrical Engineering, Ss. Cyril and Methodius University Skopje
Karpos II bb, 1000 Skopje, Former Yugoslav Republic of Macedonia
Phone: +389 (230) 99 177, FAX: +389 (2) 306-4262 e-mail: vlasto@cerera.etf.ukim.edu.mk

4.1 Introduction

This paper presents the current situation regarding regulatory framework and harmonization of legislation in Macedonia with EU directives and policy through several international agreements. It explores the socio-economic environment of use of energy, but also it presents the basic indices of energy poverty of the population in Macedonia. The area which is wide open for the improvements is energy efficiency sector. In addition, SHPP is of primary interest of the public bodies, but also of interested international investors. These two areas of interest are concerned with the new Energy law. However, the penetration of other RES in the country is still facing objective barriers.

4.2 Harmonisation with EU and the present status of RES promotion in Macedonia

4.2.1 Energy Charter Treaty

The regulatory framework and legislative environment for RES promotion is closely related with the Stabilization and Association Agreement between Republic of Macedonia and the EU (http://www.sei.gov.mk/documents/support/sofijag-rad50576-2.PDF) which was approved in April 2001. In order to enable the harmonization of Macedonia's legislation in the area of energy with the existing legislative framework of EU, the Agreement (Article 99 which is dedicated to Energy) declares that "the cooperation will reflect the principles of the market economy and the European Energy Charter Treaty and will develop with a view to the gradual integration of Europe's energy markets". It specifically states that "the cooperation shall include the following in particular:

- formulation and planning of energy policy, including modernization of infrastructure, improvement and diversification of supply and improvement of access to the energy market, including facilitation of transit;
- management and training for the energy sector and transfer of technology and know-how;

- the promotion of energy saving, energy efficiency, renewable energy and studying of the environmental impact of energy production and consumption;
- the formulation of framework conditions for restructuring of energy utilities and cooperation between undertakings in this sector."

Energy Charter Treaty (Energy Charter Treaty) approved together with Energy Charter Protocol by EU countries in 1994 has its origins in European Energy Charter signed at The Hague on 17 December 1991. Recognizing the necessity for the most efficient exploration, production, conversion, storage, transport, distribution and use of energy, this Treaty establishes a legal framework in order to promote long-term cooperation in the energy field, based on complementarities and mutual benefits, in accordance with the objectives and principles of the Charter. This Agreement proclaims collaborative efforts of all countries in the region "wishing to implement the basic concept of the European Energy Charter initiative which is to catalyse economic growth by means of measures to liberalize investment and trade in energy".

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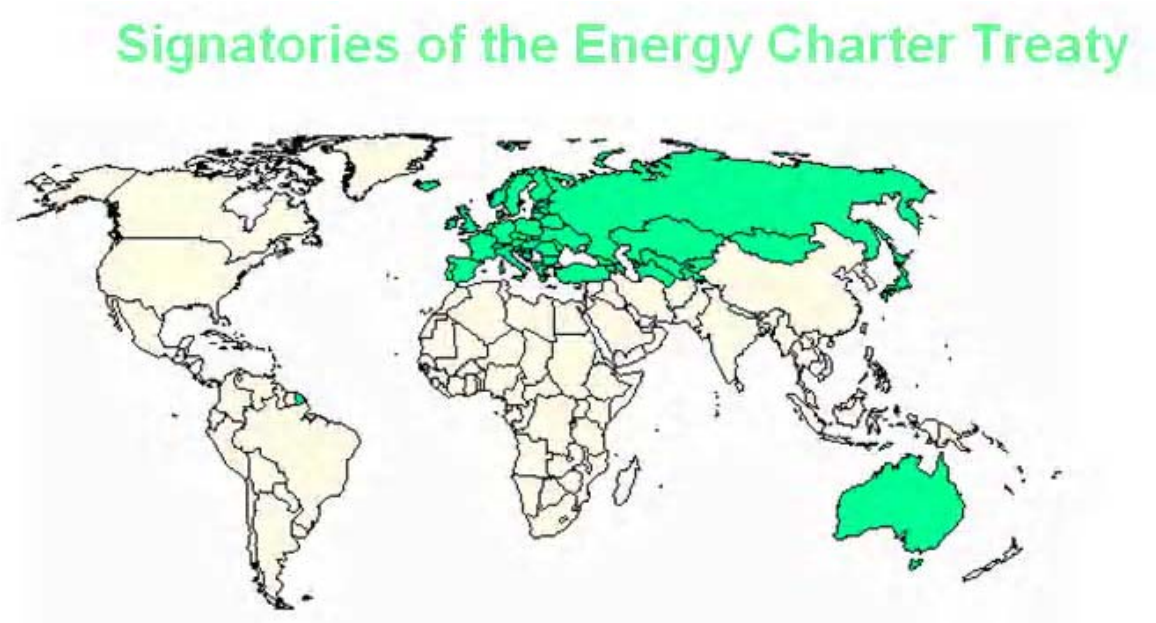


4.2.2 PEEREA

The PEEREA - Protocol on Energy Efficiency and Related Environmental Aspects is a legally-binding instrument, emanating from the Energy Charter Treaty was initiated in 1994 and fully ratified by the Charter members in April 1998. Macedonia is among the more than 50 countries having signed it.It requires its signatories to formulate energy efficiency strategies and policy aims, to establish appropriate regulatory frameworks, and to develop specific programmes for the promotion of efficient energy use and the reduction of harmful environmental practices in the energy sector. Following the recommendations of an experts

meeting on procedures for implementation of the PEEREA in March 1998, the Energy Charter Conference approved a process of periodic reviews of the energy efficiency policies of the signatories, as a core activity of the Working Group on Energy Efficiency and Related Environmental Aspects. The review process relies on two major complementary components: regular monitoring based on a review format and in-depth energy efficiency reviews.

PEEREA Obligations are formulated by following instruments:

- Formulate aims and strategies (art 5)
- Establish policies (art 3.2)
- Develop, implement, update programmes (art 8.1)
- Create the legal (art 3.2) regulatory (art 3.2) institutional (art 8.3) environment necessary
- Co-operate/assist internationally (art 3.1)

DECLARATION signed by the Environment Ministers of the region of the United Nations Economic Commission for Europe (UNECE) in KievMay 2003 states: "We support further efforts to improve energy efficiency and promote renewable energy sources as a means of meeting environmental objectives. Our Statement on Energy Efficiency reaffirms these goals. We also note the progress report by the Energy Charter Secretariat on implementing the provisions in the area of energy efficiency and invite it, in cooperation with other relevant international organizations, to report on further progress on energy efficiency efforts at our next conference".

4.2.3 GEF

The GEF - Global Environment Facility as the Implementing Agency for the World Bank is providing a support for OP5: Removal of Barriers to Energy Efficiency and Energy Conservation and OP6: Renewable Energy. The objectives of the project are to:

- Change the current unfavorable investment and incentive conditions and create an enabling environment in Macedonia that fosters the development of sustainable energy utilization (in this context defined as efficient use of energy and use of renewable energy sources) through providing financial, methodological, informational, and institutional support;
- Support a large increase in energy efficiency (EE) investment in Macedonia through development of a self-sustaining, market-based financing mechanism based on a principle of commercial co-financing. The project's goal is focused on the development and implementation of financially profitable EE projects, which can provide sustainable and increasing reductions in GHG emissions without relying on public subsidy; and
- Increase the availability of financing for renewable energy (RE) investments, enterprises and intermediaries through the establishment of a financial facility with a long-term time horizon, which will provide seed capital for equity or debt co-financing of RE development projects.

4.2.4 Kyoto protocol

With regards to environmental issues Macedonia has joined the international efforts as follows:

- Macedonia ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1997
- According to KYOTO PROTOCOL TO THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE unfccc.int/files/.../kyoto_protocol/application/pdf/kpstats.pdf has an accession status from 18/11/04, and entry into force from 16/02/05.
- Macedonia can seek financial incentives from the Clean Development Mechanism
- Ratifying Kyoto would also make Macedonia eligible for financing energy efficiency projects through the World Bank's Prototype Carbon Fund.

4.2.5 Legislative actions to enable the harmonization of Macedonia's legislation in the area of energy with the existing legislative framework of EU

The essential focus of the National Environment Activities Plan adopted by Parliament in 1996, is to:

- Adopt the Law for the Improvement and the Protection of the Environment which addresses, among other things, the negative impacts on the environment by the energy sector activities. Energy efficiency is one way to reduce the magnitude of these impacts;
- Establish the Ministry for Environment and Physical Planning;
- Establish a financial institution which would provide financial support for environmentally responsive investments (the Fund for the Environment); and
- Develop a program to assist municipalities in understanding and preparing Local Environmental Action Plans.

It is important also to note that the Fund for the Environment has supported the design and financing of several projects related to energy efficiency and renewable energy sources.

First approved in 1997clause 17-a of Energy Law (Official Gazette of the RM No. 47/97, 40/99 and 98/2000) initiates an energy efficiency program "the Government of the Republic of Macedonia approves a long-term program on efficient energy utilization". The obligation to identify the potential for efficient energy use also emanates from this clause. In particular it refers to the need to pursue the creation of:

- Information and educational activities for increasing energy efficiency;
- Incentives for increasing energy efficiency;
- Legislative and other regulatory measures which will increase energy efficiency;
- Activities that support the compliance with the energy efficiency components of international agreements.

To implement the Programme stated in Article 17-a of the law herein, the Government of the Republic of Macedonia shall establish a Fund of Energy Efficiency.

Several amendments closely related to energy efficiency and renewable energy sources have been introduced lately:

- Energy Charter Amendments - 2000
- Energy Regulatory Commission (ERC) Amendments - 2002
- Electricity & Natural Gas Markets Amendments -2005

Fast changing environment and adoption of international agreements has created a need for adoption of a new Energy Law, which is expected to pass Parliament's procedures as far as February 2006. The new Energy law has several modules which regulates the area presented in this paper:

- Energy Efficiency Module
- Renewable Energy Sources Module
- Environmental Protection Module

The Energy Efficiency Module stands for:

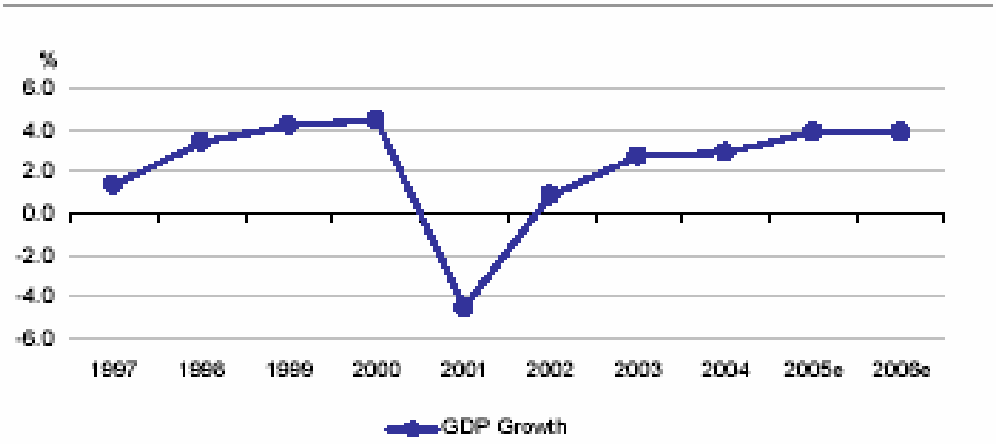
- Authority Institutions: Government of RM, Ministry of Economy of RM, Local Government, Energy Agency of RM
- Energy Efficiency Strategy
- Energy Efficiency Programme
- Local Energy Efficiency Programmes
- Energy Efficiency Technical Specifications.

4.3 Socio-economic aspects

In order to foresee the penetration of RES it is very important to analyse the country's socio-economic environment in the energy sector.

Positive economic trends at the close of 2000 came to an abrupt end with the armed conflict of 2001. GDP declined by more than 4 percent, the fiscal balance and the balance of payments deteriorated severely, and reforms were stalled.

Although industrial production improved in 2002 and early 2003, it is expected to remain below the pre-conflict levels until 2004. Exports remain depressed and the high levels of risk discourage foreign investors. Tax revenues also remain low, whereas budgetary expenditure, particularly social welfare expenditure, remains high. Real GDP growth of 3-4 percent is projected for 20003/4, with average inflation of 4 percent and a fiscal deficit of 3.5 percent.



According to Affordability Study Draft Final Report v 1.3 9-10-2003: "By 2001, 23 percent of people in Macedonia lived below the official poverty line, which is defined as 70% of the median equivalised consumption of households or MKD 3000 (€45.45) per month, per individual. Under

this definition, about 23% of households and 24% of individuals in the Republic of Macedonia had inadequate resources for living in 2000".

Power sector affordability currently is a problem for many consumer groups in Macedonia:

- Traditional poor (rural agricultural households)
- „New poor" (socio-economic transition)
- Chronically poor (social exclusion).

That is closely related to the energy poverty indices:

- The Poverty Index shows that on average, 55.1% of total population experiences various forms of poverty
- The percentage of households living below the poverty line is constantly increasing, 30.2% in 2003
- The poverty rate of households with 6 and more members is 43.6%
- Skopje has the highest rate of poverty (33.6%), other urban areas have rate of 29.1%, and the rate in rural areas is 29.0%.

With the above presented data it is obvious that the area which is wide open for the improvements is energy efficiency sector.

4.4 Present status of RES

RES promotion activities in Macedonia currently are focused on SHPP small hydro power plants. The state own SHPP (new company ESM) are listed in the following table:

SHPP	No. of units	MW	Commissioned
Kalimanci	2	12,8	1970
Dosnica	3	4,5	1953
Matka	3	4,2	1938
Pesocani	2	3,6	1951
Sapuncica	2	2,8	1952
Pena	2	2,5	1926
Zrnovci	2	1,2	1950
Sapka Cascade	4	5,2	1993
Turija	2	1,1	1987
Bogomila	3	0,9	1957/1995
Belica	1	0,3	1989

From the table above it can be concluded that most of SHPP are constructed from 1926 till 1970. Only four of them are constructed in the last 10 years. Presently foreign investors are interested in obtaining concessions for building new SHPPs. Almost 300 locations for building new SHPP are registered as projects, or feasibilities studies or just listed as potential sites.

4.5 Recommendations for future activities

At present two areas of RES implementation have been foreseen: 1) Energy efficiency and 2) Investments in SHPP. These areas of interest are subject of the new Energy law which includes Energy Efficiency Module, Renewable Energy Sources Module and Environmental Protection Module.

Other renewable sources in this moment are under observation of utilities, international investors, Ministries, Forums, Chamber of commerce etc. However, some objective barriers still exists, like:

- Until more comprehensive studies regarding the potential of wind in some locations are undertaken, it is not possible to include wind potential in the current energy balances and power system development plans.
- Geothermal resources could have the potential to be expanded for some agricultural processing but are limited in their economic potential to be applied for district heat.
- Solar energy can be used for direct conversion to electricity and for hot water production. There is experience with both in Macedonia, but so far the economics of solar energy prevent further penetration on any significant scale.

5 Overview of Existing Res Regulation in Serbia and Montenegro

Elena Boškov
DMS Power Engineering Ltd
Puškinova 9a, 21000, Novi Sad, Serbia & Montenegro
Phone:+381 21 475 0376, FAX: +381 21 455 865, e-mail: elena.boskov@dmsgroup.co.yu

5.1 Introduction

More than a decade of under-investment and lack of maintenance has left the power system in Serbia and Montenegro operating at the edge of fundamental safety and reliability requirements. Power plant capacity has been deteriorating over the last decade, while household power consumption has been steadily increasing. Transmission and distribution losses are among the highest in Europe. Current production levels are unable to meet countrywide demand for power. To meet demand there is a need for new power plants and maintenance on existing production and transmission facilities.

Table 1: Serbia/Montenegro Country Summary Table

Demographical Information	
Population, millions (2003)	8.3
Land area, thousand Ha (2002)	10,217
Macroeconomic Information (2003)	
GDP, billion US$	20.4
Real GDP growth rate, percent	2.10
Foreign direct investment (net), million US$	1,405
Electricity sector	
Electricity tariff, US¢/kWh (2002)	3.6
Collection rate, percent (2002)	84
Load utilization factor, percent (2000)	NA
Electricity disposition, billion kWh (2003)	
Generation	36.04
Consumption	36.62
Exports	0.40
Imports	3.50
Generation capacity, million kWh (2003)	
Nuclear	0.0
Thermal	6.7
Hydro	2.9
Other renewables	0.0
Total	9.6

Sources: European Bank for Reconstruction and Development, U.S.

Energy Information Administration, Food and Agriculture Organization of the United Nations.

There are rural areas in Serbia and Montenegro which need much better living conditions and better basic energy supply coupled with the creation of small-scale industry to provide labour and hinder migration to urban centres. For example, hundreds of villages in the mountain region (Stara Planina, Pester Plato, South Kopaonik, Prokletije) are either too far from the existing electrical grid or too often without electricity supply. Also, there is often very little growth in production levels following electrification in rural areas, because operating costs are not covered by revenue and the capital repayments have to be subsidized, resulting in poor maintenance. Severe weather conditions in some of the remote areas make maintenance of electrical grid and distribution systems unreasonably high. It is therefore of vital interest to develop free - renewable demand-side managed and autonomous primary energy resources.

Although Serbia and Montenegro is not a member of the EU yet, there is a strong political will and need to harmonize domestic conduct and legislation relating to water with European practices. The current Government of Serbia has followed a structured approach towards European Integration, continuing the work launched under the former administration. A comprehensive strategy for joining the EU is in preparation.

Table 2: Resources of RES in Serbia*

Small hydros	1800 GWh/year	electricity
Biomass	2,58 mil. toe/year	heating
Geothermal	180 000 toe/year	heating
Wind	Not available	
Solar	3,8 kWh /m2/day	global yearly average Solar radiation

*Sources: Energy Efficiency Agency of the Republic of Serbia

5.2 The reform process of the Serbian energy sector

5.2.1 Policy development

The aim of policy development is to set up short/medium term guidelines for all participants in energy activities. Cornerstone of such policy development is energy demand and supply management, supported by least cost plans for rehabilitation, modernization, up-grading of old and investing in new energy production capacities, including the financing of technical measures for energy savings and improvements of energy efficiency. The main goals of Energy Policy are increase of overall sector efficiency, security of energy supply, introduction of competition and compliance with relevant stipulations of EU Acquis Communitaire while following principles of sustainable development. The energy policy is pursued through the implementation of the Energy Sector Development Strategy, the Strategy Implementation Program and the Energy Balance.

5.2.2 Legislative and institutional framework development

Both legal and institutional frameworks, with aim to enable viable and efficient energy markets, are defined by the Energy Law.

Current energy challenges in Serbia are:

- . High energy consumption in buildings with large share of use of electricity for space heating purposes
- . Low energy efficiency in industry with out-dated energy-intensive manufacturing technologies
- . Technically deteriorated, energy inefficient and polluting municipal energy supply services
- . Low exploitation of the available potential of renewable energy sources
- . Unsustainable financial operation of energy supply companies due to energy prices not reflecting actual production costs
- . Need for large investments in the energy sector to improve and modernize energy infrastructure
- . Need to develop and implement a comprehensive policy designed to improve energy efficiency and the utilization of renewable energy sources.
- . Access to electricity and other energy services, through either grid extension or decentralized energy technologies, in both urban and rural areas, including main program objectives, impacts and progress;
- All electricity users in Serbia in both urban and rural areas (almost 100%) have access to electricity grid.
- . Efficient use of energy in the household and commercial sectors through, e.g., introduction of improved cook stoves or liquefied petroleum gas (LPG) for cooking, minimum energy performance standards for appliances and lighting, energy efficient building codes, and metering. According to the recently approved Energy Development Strategy this is the third priority which should be implemented as of 2007.
- . Improved efficiency in energy supply (e.g. energy generation, transmission and distribution).
- Policies to facilitate the transfer of modern energy technologies, such as export promotion policies or establishment of an enabling environment for investments, including their objectives, the types of financing available and other incentives provided to facilitate technology transfer.

There are a lot of different projects concerning efficiency improvement in energy generation, transmission and distribution. These issues are treated by Electric Power Industry of Serbia and through National Energy Efficiency Program managed by Ministry of Science and Environmental Protection of the Republic of Serbia.

INVESTMENT- It is possible to invest in Serbia through acquiring shares or establishing companies, as well as obtaining concessions or concluding BOT deals.

NATIONAL TREATMENT is secured for foreign investments and companies with foreign capital, with the possibility of obtaining preferential treatment if such treatment is envisaged in a concluded international or bilateral treaty between the state of the foreign investor and Serbia.

TRANSFER OF PROFIT- Company has a right to transfer (repatriate) its income derived from foreign investments such as profit or dividends, property, subject of investment, amounts originating from sales of stakes or stock of a company with foreign investment, amounts acquired on the basis of decrease of the basic capital of a company with foreign investment etc.

FREE IMPORT OF GOODS that represents the investment of the foreign investor is allowed.

SIMPLIFIED REGISTRATION- the procedure for company registration is simplified by establishment of the Agency for registration and shortened deadline for deciding upon filed requests. This deadline is 10 days now, and it will be shortened to 5 days as of 01.11.2005.

TAX REGIME- the VAT has been introduced as of 01.01.2005. Serbia has the lowest corporate profit tax in the region.

5.2.3 Restructuring of the energy sector within the last ten years to improve the functioning of energy markets

The Electrical Power Company of Serbia (EPS) is since 1992 the national company for generation, transmission and distribution of electrical energy including both the open pit and underground coal mines.

Electric Power Industry has already been split into two independent entities, by the Government Decree:

- Transmission (EMS),
- Electricity Supply (Generation and Distribution) including electricity trade (EPS), while the functional and financial separation are in the progress.

The model for restructuring of our public Oil and Gas Company - NIS is in the final phase of decision-making.

5.2.4 Legal and regulatory frameworks related to overall energy policies that have been adopted

Parliament of Serbia has adopted Energy Law on July 23, 2004. The Energy Law can be used to institute a systematic, dynamic, open and responsive policy-making process. Energy Law will be a base for reorganizing Serbia's energy sector and integration in European community. One of the most important activities arising from this law is Serbia's full participation in the regional energy market in southeastern Europe, i.e., the Energy Community of South East Europe (ECSEE).

One of the objectives of the new Energy Law is **establishment** of the competition on the energy market based on non-discriminatory principles (Ensuring equal legal status to all subjects at the energy market, open energy market and non-discriminatory access to energy

systems and supply networks). In that purpose the founding of the **Regulatory Agency** for the Energy Sector is predicted by Energy Law.

According to the Energy Law there are several long-term objectives:

- secure, quality and reliable supply of energy and energy carriers;
- long-standing and balanced development of energy industries in order to provide the quantities of energy and energy carriers, necessary to meet the customer needs;
- stimulation of market competition based on principles of non-discrimination, transparency and stimulation of competitiveness of the economy in the Republic of Serbia;
- creation of conditions for safe and reliable operation and functioning of energy systems;
- provision of conditions for enhancing energy efficiency in the whole chain of energy-related activities and energy consumption;
- creation of transparent, attractive and stable conditions for investments into building, revitalization and upgrading of energy-related facilities and systems, as well as creation of conditions for their connection to energy systems of other countries;
- stimulation of use of renewable energy sources and environment protection;

The recently adopted Serbian Energy Sector Development Strategy provides medium-term Priority Programs of tangible development of energy sub-sectors in accordance with the Serbian energy policy objectives which, besides the basic objectives that are more or less the same as in any other country, include two additional ones. The first one is a specific Technological and Environmental Objective concerning the fully irregular conditions for operation of energy sub sectors during the past decade, while the second one is a generic long–term developing objective, within the national energy infrastructure and regional strategic objectives concerning the need for integration of our energy infrastructures into the regional and all European energy markets.

Selection of the Priorities in the medium term Serbian Energy Sector Development Strategy is based on a detailed analysis of the Serbian current and future economic activities, current constrains in the capabilities of the energy supply sub -sectors, and the structure of final energy carriers in the energy consumption sectors, including the acceptance of environmental impacts from the existing energy production sources. With respect to the long -term production response from new power plants operated on the domestic lignite, and the demographic and macro-economic assumptions used to derive the future energy demand for two scenarios, a prosperous one and a slowdown of economic and industrial activities up to 2015, five Priority Programs have been selected. For their implementation, measures and instruments are proposed. Assessments of energy demand and energy supply, in both scenarios, are based on the integrated policy for efficient energy production and energy end- use, as well as on the need for cost-effective use of renewable energy sources, respecting the benefits of the entire economy, energy system, and environmental protection.

The selected Priority Programs (table 3) are:

Table 3: Dynamics of Serbian energy reforms and priorities in coming years

REFORMS OF THE SERBIAN ENERGY SECTOR: 2004. Energy Law adopted; 2004. Establishing of

REA (2004); Energy sub-sectors reforms: Legal, Functional and Financial separation and Privatization of Energy Public Companies (2005); REA Enforces Energy Services and Prices Regulations (2006); Energy Market Design and Operations (2007); Realization of the First, Second and Third Priority Programs (2012); New Energy Entities Commercialization and partial Privatization (>2012).	
First Priority - Improvements of technical and operational performance of energy production systems/units	**Programs for technical and operational improvements of energy conversion/transformation systems:** Oil sector Gas sector Coal sectors Electric Power Sectors: Generating Units (TPP,HPP,CHP) Transmission system Distribution systems District Heating Sector/Industrial Energy (Power and Heat) Sources
Second Priority - Rational energy use and improvements of energy efficiency	**Programs for rational energy use and improvements of energy efficiency by:** Replacement of electricity for space heating through numerous local Projects for households gasification in urban/sub -urban areas Fossil fuels savings by improvements of Boilers efficiency and on this basis connects the new heat consumers on the existing DHS Reduction of electricity and heat transport/distribution losses, including heat losses in industrial thermal processes/equipment
Third Priority - Selective usage of renewable energy and a energy efficiency for environment acceptable production technologies	**Programs for new RES and New Technology/electrical appliances / devices as follows:** Selective use of RES (Biomass, Wind, Geothermal/Solar) Increasing the natural gas utilization by CHP production Introduction of efficient lighting devices and new households, electrical appliances Private investment in small HPP's
Fourth Priority-Short-term investment in new power and heat production units	**Programs/Projects for investment in a new CC Gas Technology and CHP units:** Emergency investment in a new 250 MW/220MJ/s CCGT power plant unit, within Electric Power Industry Sectors and possible investment in a series of small /medium size CHP, within municipal/industrial sectors, based on natural gas, for combined electricity and heat production
Fifth Priority-Medium/long-term capital-intensive investment in new capital energy infrastructures, and participations in planning and investments in strategic (regional/European) energy infrastructures	**Programs/Projects for medium/long- term intensive investments in a new infrastructures:** Large TPP's : Completion of TPP "Kolubara B" or investment a new TPP units on the basis "Kolubara", "Kostolac" or /and KiM lignite, including private investment Large oil transport infrastructure system (diversification of oil sources and transport lines, with regional connection)

	New natural gas supply/storage systems (diversification of oil sources and transport lines, with regional connection) New strategic electricity production units on "border" rivers, including investments in new large pumped storage hydropower plants, for regional/European electricity markets supply, with all modes of investments/owners

Basic Energy Subsector-oriented Priority Programs, focused on the continued improvement of technical and operational performance of energy conversion and/or transformation infrastructure systems;
Program- oriented Priority, with specific Programs for rational use of energy and improved end-use energy efficiency;
Technology-oriented Priorities, with specific Programs for selective use of RES and new, energy - efficient and environmentally acceptable technologies for additional production of electricity and heat in centralize d and decentralized power systems;
Emergency-oriented Priority, with optional Projects for urgent investment in new electricity and heat production sources, based on gas technologies (CCGT), in order to avoid electricity shortages;
The long- term Serbian energy sub-sectors development Priorities, with specific Programs for development of energy supply sectors (with new energy production technologies), and regional strategic and new regional electric power infrastructures (Pump storage hydropower plants and transmission systems), including oil and gas pipeline transportation systems for domestic, regional and all European energy markets.

5.3 Major Groups participation in energy decision-making

At the national level the main decision-making organization is Ministry of Mining and Energy of the Republic of Serbia. The responsibilities are defined by new Energy Law.

Ministry of Mining and Energy (MoME) is charged by Republic of Serbia with governmental affairs regarding: Electricity Power Sector, Geology and Mining Sector, Oil and Gas Sector, General Energy Sector (Communal energetic/ Municipality), Energy Balance of Republic of Serbia, provision of conditions for the operation of Public Enterprises under its jurisdiction. Ministry of Energy and Mining is in charge of Governmental energy policy making, preparation and adoption of energy legislation, secondary legislation and regulation.

The **Serbian Energy Efficiency Agency (SEEA)** is a national non-profit organization founded in May 2002 by the Government of the Republic of Serbia on behalf on financial support of EAR. The Serbian Energy Efficiency Agency develops and proposes programs and measures, co-ordinates and stimulates activities intended to achieve rational use and saving of energy, as well as increase in efficiency of energy use in all sectors of consumption; collects data on energy consumption; proposes measures for obtaining financial resources and for technical assistance, including monitoring; proposes financial support and priority projects and monitors results following implementation of projects; in co-ordination with relevant Ministries,

cooperates with similar international, foreign and local institutions and performs other activities at the request of the Government of the Republic of Serbia.

Programs designed to increase the share of renewable energy in the national energy supply mix, including information on their goals and targets.

According to the Energy sector development strategy a development o f program for Renewable energy sources is foreseen.

In order to stimulate wider use of Renewable Energy Sources, the New Energy Law recognized the category of privileged power producers, which in their electrical power generation process use renewable energy sources or waste, those who generate electrical power in small electric power plants (up to 10MW), as well as those who simultaneously generate electrical power and heat, if they meet energy efficiency criteria.

Privileged power producers shall be entitled to subsidies, tax relief, customs exemptions and other relief in line with laws and other regulations on taxes, customs and other duties, i.e. subsidies and other incentive measures.

Currently, the working group of the Ministry is established for the purpose of development of the secondary legislation which will define criteria for obtaining status of Privileged power producers. Through the CARDS program 2002 Energy Efficiency Agency was granted a Donation for the implementation of projects in order to stimulate energy efficiency and wider use of renewable energy sources. 200.000 € is assigned to promotion of RES for demonstration programs, development of a few studies and organization of seminars.

– **Energy Regulatory Agency** is an independent, non-profit organization with jurisdiction in Electricity, Oil and Gas and District Heating Sub-sectors. Main duties of the ERA are enhancing and directing the energy market development, price regulation, licensing, compliance monitoring, dispute settlement etc.

– **Energy Efficiency Agency** is special organization for carrying out professional activities of improving conditions and measures for energy and energy sources rational use and saving, as well as increasing efficiency of energy use within all sectors of energy consumption

– **TSMO –** Transmission and Market System Operator

– The Law will result in the restructuring of public energy companies and is for the first time enabling non discriminatory participation of Individual Power Producers in the Serbian energy market.

The Agreement on the Energy Community of the Countries of South Eastern Europe was signed in March 2005 under the European Commission's auspices. The following matters are going to be covered hereinafter: (1) status of energy sources in Serbia; (2) legislative and economic conditions for operation; and (3) priorities and projections of development as provided by the Strategy.

5.4 Projects, campaigns and educational programs

Motivational and educational advertisements are used to educate consumers on energy and environment related issues. The aim is to raise awareness of energy efficiency and environmentally sound energy systems.

Public information campaigns and educational programs are organized by Serbian Energy Efficiency Agency in several different sectors like industry, residential & commercial and transportation sector.

Energy Efficiency Agency has undertaken several trainings in this area:

- Training on energy management in Municipalities
- Training on energy management and energy auditing in Industry
- Demo project – Development of Energy Plans for three Municipalities
- Seminar on use of Biomass was held in April 2005

There are a lot of different projects concerning research and development of renewable energy, energy efficiency, advanced energy technologies, cleaner fossil fuels, etc. These issues are treated by National Energy Efficiency Program managed by Ministry of Science and Environmental Protection of the Republic of Serbia, and few different faculties and research institutes.

5.4.1 Prospective projects

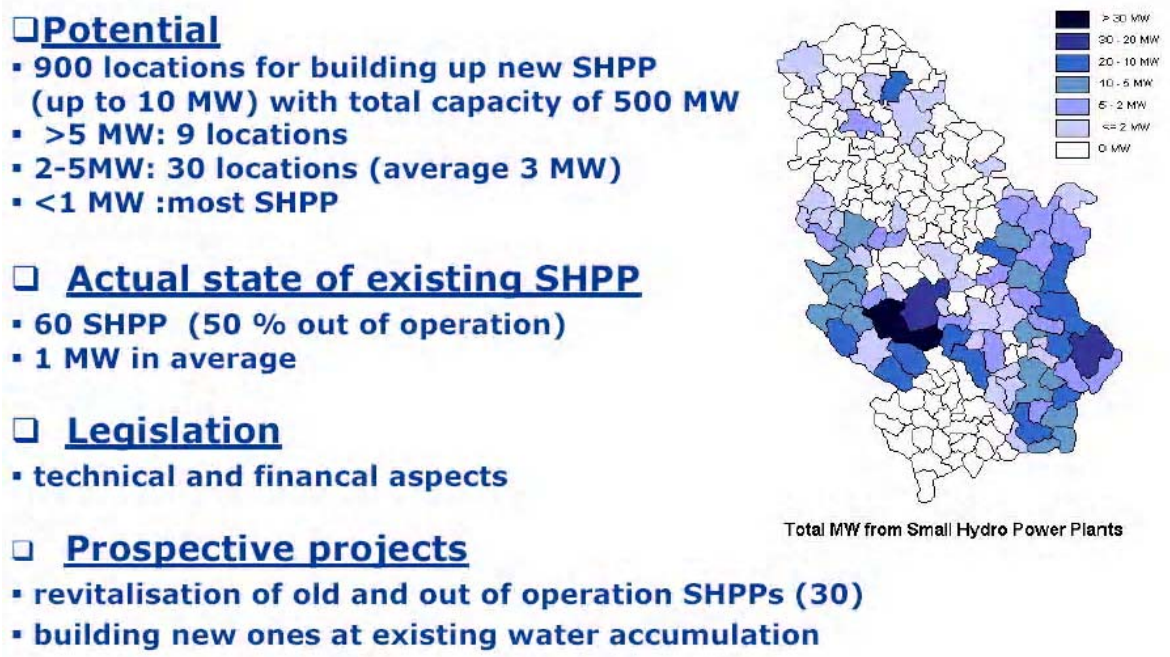


Figure 1: Small hydro energy potential in Serbia

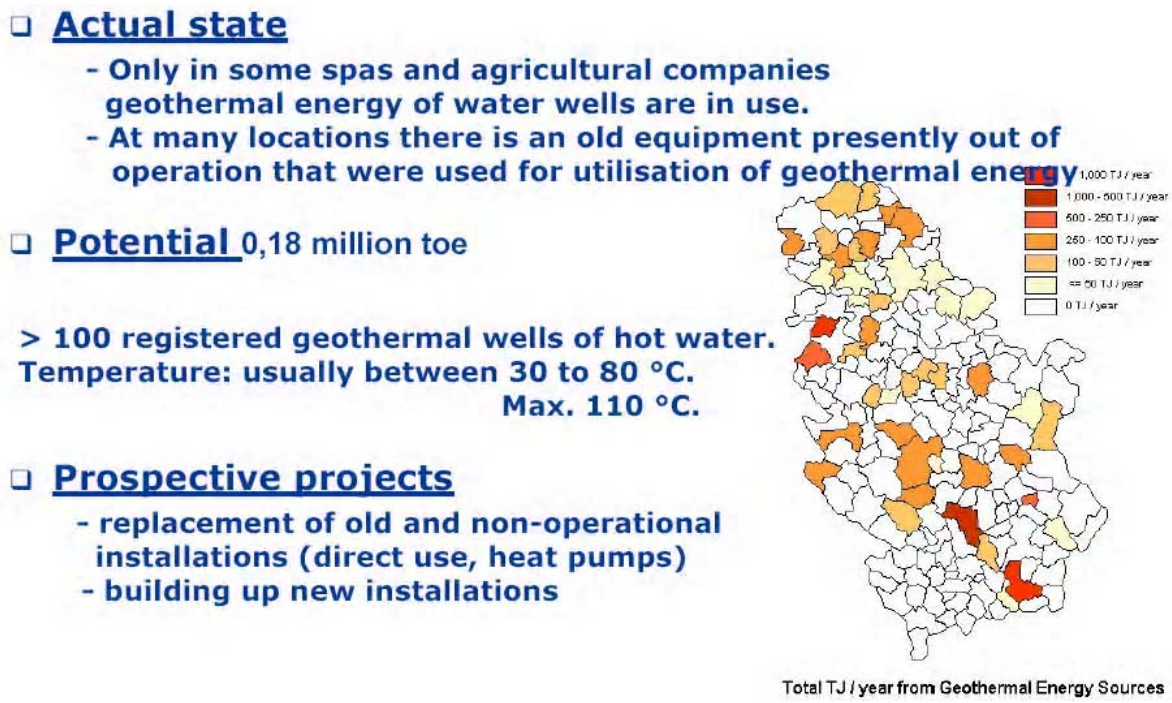


Figure 2: Geothermal energy potential in Serbia

Specific measures need to be taken to establish an appropriate environment leading to attracting investments in the energy sector: pricing/subsidy reform; fiscal and financial incentives; power purchase agreements; other arrangements.

Those are ongoing activities according to the Energy Law.

5.4.2 ¸ Technical recommendation No.16

Besides the Energy Law regulation, a regulation giving guidance and provides information about basic technical requirements for connection of small-scale power in distribution network in Serbia is Technical recommendation no.16 issued by Power Company of Serbia.

Its main aims are:

- Based criteria for connection of small scale power under distribution network conditions and characteristic sources of power
- standard solutions for connection,
- providing solution for metering and meter point electrical energy and power
- providing solution for choosing protection relays and other equipment
- providing solution for compensation of reactive power
- providing solution and appropriate order of activities for connection to the network with necessary documentation (forms, sheets)
- providing method and conditions for starting an operation of small-scale power and parallel work with network scale
- the method of management of small-scale power facilities.

This recommendation has been issued in order to strengthen energy planning, management of energy efficiency and development of new and renewable sources of energy.

The main chapters are:

1. The range importance and object
2. Terms and definitions
3. Base technical data – distribution network
4. Base technical data – small scale power
(25 kVA - 16000 kVA)
5. Based criteria for connection small scale power
    a) maximum power criteria
    b) flickers,
    c) maximum current criteria and harmonics
    d) Short– circuit level of power at connection point
6. Based criteria for connection point (equipment)
7. Basic criteria for metering point (equipment)
8. Generator protection and connection line protection
9. Compensation of reactive power
10. Documents and connection agreement
11. First connection of small scale power to distribution network
12. Facilities
13. Schemes for connection of small scale power to distribution network

5.5 Conclusion

Current production levels in Serbia and Montenegro are unable to meet countrywide demand for power. To meet demand there is a need for construction of new power plants and maintenance of existing production and transmission facilities, especially disseminated small scale renewable power.

The main purpose of the energy sources system is the creation of new and better conditions for operation, business and development of the energy producing and consuming sectors, which in return would give a motivation to the economic development of Serbia, protection of the environment and integration of the local energy sources sector into the regional and European energy markets. The achievement of the mentioned purpose is conditional on the implementation of five priority programs relating to the following: Technological modernization of the existing energy producing systems, rational use of power sources and risen energy efficiency in the energy production and consumption sectors; investment in the construction of new power source facilities, exploitation of new renewable energy sources (biomass, small hydroelectric power stations, geothermal energy, wind energy and solar energy) and reducing the harmful emissions in the energy production and consumption sectors.

The new legislation incentives should be made for a single development policy to be conducted on the Republic level and create conditions for continuous and stable development in

the field of power sources. Pursuant to the Energy Law, in 2005 was signed the Strategy of long-term development of power sources in Serbia for the next decade, which set the most important aims of the new power sources policy and the priority courses of development.

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6 Market-based Support for RES-E via Green Certificates in Slovenia

Andrej Gubina
University of Ljubljana, Faculty of Electrical Engineering
Tržaška 25, 1000, Ljubljana, Slovenia
Phone:+386 4768 242, FAX: +386 426 46 51, e-mail: andrej.gubina@fe.uni-lj.si

Abstract: With liberalization of electricity market, electrical energy has become trading commodity and can have different price and quality, also with regards to its energy source. Electricity from renewable energy sources (RES-E) has become an important factor in European Union (EU) efforts for sustainable development as well as in trading. EU and Slovenian legislation already prescribes the way for tracking and marking the source of energy. One step further are the voluntary systems for green certificates, which in addition to tracking of the energy source also trace the information reliability, consistency and its transparency.

In this paper we present briefly the Renewable Energy Certificate System (RECS), which was established in Slovenia in cooperation with RECS International and Energy Agency of Republic of Slovenia (AGEN-RS). RECS system is the cornerstone for setting up of the RES-E market in Slovenia. We present the RES-E product “Modra energija” (Engl. Blue or Wise Energy) that enables the customers to choose the electricity from the environmental friendly source. The “Modra energija” Project and the mechanisms for quality assurance are presented in the paper.

6.1 Introduction

We can define the Renewable energy sources (RES) as the sources of energy are in part or entirely preserved in nature, particularly the energy of water flows, wind, biomass, and sun energy 0. In the light of Kyoto protocol and higher environmental demands in EU, the field of Renewable Energy Sources is becoming more and more important. Support of the use of electrical energy from renewable energy sources (RES-E) is very important for emissions reduction of CO_2 and other greenhouse gases. At the same time this means reduction of dependence from electricity imports and assures the development of new technologies and industry.

European Union has ambitious plans on development of RES-E. In the long term a lack of RES-E can be perceived from the average structure of production sources in UCTE (UCTE Mix), as the quantity of Hydro Power in it is between 15,7 % (2000) and 12,8 % (2004). Target of RES-E in EU-15 until the year 2010 is 22,1 % 0, but research shows that the current measures taken allow for only 17,5 % of consumption to be covered by RES-E in 2010 0.

Slovenia needs to implement new, timely measures for RES-E incentives, in particular market-based incentives for consumers and producers of RES-E. As a EU member Slovenia must increase its share of RES-E in consumption from 29,9 % in year 1999 to 33,6 % until the year 2010 0,0.

There is an obvious need to harmonize the legislation in EU to encourage consumption of RES-E, thus also giving a clear market signal to increase RES-E production. Projections of Berlin Forum show that the optimal measures could allow the largest share of RES-E in EU to reach 34 % in year 2020 0. There is also a considerable shortage of RES-E in the new EU member states. The RES-E target in new member states is 11,6 % in year 2010, but the share of RES-E in year 2000 was only 5,6 % 0,0.

6.2 RES-E Market

In the power system that connects power plants and consumers, electricity is produced in RES-based- as well as fossil- or nuclear-based power plants at the same time. RES-E is therefore available in the system; the challenge is to enable the consumer to purchase this specific form of energy.

6.2.1 RES-E purchase contracts

The flow of electricity is governed by physical laws. A consumer can only be supplied from a particular power plant if there is a direct power line between the power plant and the consumer to which no other power plant is connected. Slovenian transmission system is of meshed design to which all consumers and producers (regardless the production source) are connected. To enable trading with electricity, transactions are treated on two separate levels: the physical flow of electricity and the supply contracts that define path, quantity, time and price of electricity transmission. Contract signature and electricity production are completely decoupled in time and in space. In addition to that the production attributes of electricity, such as its greenness, add a third layer of information, decoupled from physical and contractual. Ss shown in Fig. 1, electricity is traded for the time ahead, produced and consumed at the same time, while its production attributes can be issued, transferred and redeemed only afterwards.

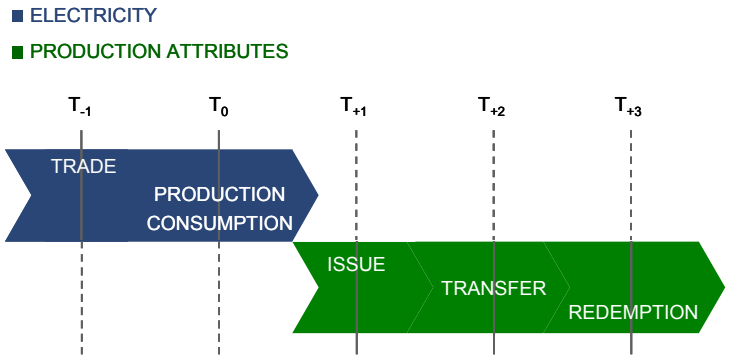

Fig. 1 Time-decoupled life cycle of electricity and its production attributes

Electricity supply contract that defines electricity production source, especially from RES, is therefore in many ways an abstract notion, as it is physically impossible to guarantee the origin of electricity that the buyer will receive from transmission grid. A system is therefore needed that will allow for separation of information about production attributes of electricity from electricity itself, provide for the transfer of this information between the buyer and seller and enable a merger of the information and electricity. The system must include an instrument for transfer of this information which should be tradable separately from energy and should be at the same time transparent, reliable and trustworthy.

6.2.2 Green certificates

The proper instrument for transfer of the information on production attributes of RES-E is a renewable or green certificate. It comprises a record on production unit characteristics, energy source and the date of production. The quantity of energy which they relate to is usually standardized. Collection of data and the issuing of certificates should be electronically supervised and independently verified. It is essential that the certificates are traded separately from electricity due to the inherently different timescale of their life cycle.

The price of a green certificate reflects the value of RES-E production attributes – its environmental benefit – that are embodied in the certificate. The price can be calculated as the difference between the price of the »grey« electricity and RES-E on the market. The consumer purchases a certificate on the market and can use it either in the frame of a RES-E support scheme, for own promotion or some other purpose. In any case, the merger of production attribute information embedded in the certificate with the electricity purchased on the market is should be assured. This way, the consumer decides whether to purchase the green certificate and consequently support RES-E.

The first successful international initiative for green certificates in Europe began in the year 2001 with setting up of RECS International (RECS-I). The EC research project on Renewable Energy Certificate System (RECS) within the 5. Framework Program, in which European countries developed the RECS certificate successfully concluded the test period in 2003. RECS certificate designates production of 1 MWh of RES-E. It contains detailed information about place, time and the production technology of the pertaining RES-E, as well as an earmark

whether this energy has already been subsidized at production or at the construction of production capacities. Certificates can be issued for all types of RES. Along with the disclosure of the energy source they provide for reliability and transparency of the pertaining information.

6.2.3 Guarantees of Origin

A similar instrument to green certificates (e.g. RECS), Guaranties of origin (GoOs) are gaining on importance as the foundation for RES-E market in EU. Issuing of GoO for each MWh RES-E is foreseen in the fifth article of EU Directive 2001/77/EC 0, while since October 2004 the trading with them is possible. Tracking of GoOs is independent of electricity trading. The Directive obliges the members of EU to recognize each others' GoOs. The suppliers can use them also for the public disclosure of the supplied energy source origin, as stated in the Directive 2003/54/EC 0.

It their design, GoOs are very similar to RECS certificates. Among other things, RECS standards are a little more rigorous in disclosure and supervision of data on energy production, and the procedure for issuing of the RECS certificates is internationally harmonized, while the GoOs can be issued by the authorized national agency. One of the reasons for EU to introduce GoO instrument is the fact that the RECS system is a private initiative and as such could not be used as an obligatory European regulatory instrument.

Many countries in Europe have already passed national bylaws on GoOs that provide for their transfer and trading independently from energy (among them are Austria, Belgium, Germany, Denmark, Finland, Italy, the Netherlands, Norway, Portugal, Sweden and Great Britain and Switzerland). Following the development of certificate systems and potentially prevalent influence of GoO on the market in the future, there are activities in the RECS International and AIB to adapt the RECS system for trading with different types of certificates. Harmonized procedures and databases would enable RECS system to accommodate RECS certificates as well as GoOs. An EECS (European Energy Certificate System) Working Group at RECS International has set up an electronic system for harmonized trading with GoOs in EU. EECS Basic Commitment, 0, represents a harmonized set of rules for trading with GoOs in Europe and their trading. Tab. 1 is showing a current status of EECS adoption in EU countries, 0.

Country	Implementation	EECS Standard	Issuing body for guarantees of origin
Austria	Yes	Yes	E-Control (regulator)
Belgium	Yes		Regulator
Denmark	Yes	Yes	TSO
Finland	Yes	Yes	TSO
France	In progress		TSO&DSO
Germany	Yes	Applicant	Any EMAS accredited auditor
Ireland	Unknown		unknown
Italy	Yes		TSO
Netherlands	Yes	Yes	TSO
Norway	Yes	Applicant	TSO
Poland	yes		URE (Regulator)
Portugal	No		TSO (to be appointed)
Slovenia	In progress		Energy Agency of the Republic of Slovenia
Spain	No		unknown
Sweden	Yes	Yes	TSO
Switzerland	In progress		TSO (to be appointed)
UK	Yes		Ofgem (regulator)

Tab. 1 Current status (August 2005) of the implementation of the guarantee of origin in countries that are active in RECS International

In Slovenia, several bylaws are in preparation, among them the Act on Issuing of Guarantees of Origin, which will prescribe details of the GoO issue and is based on Slovenian Energy law 0 and EU Directives 0, 0. The following elements are considered:

- The issuing body will be Energy Agency of the Republic of Slovenia;
- The system is compatible with other national systems, linked to the EECS standard.

These instruments and the accompanying measures will without doubt stimulate Slovenian consumers' awareness of RES-E and increase the RES-E penetration.

6.2.4 Support scheme for RES-E in Slovenia

There is a feed-in system operational in Slovenia. The feed-in system is characterized by the following elements:

- There is a different tariff for small hydro (up to 1 MW and from 1 to 10 MW), biomass, solar, geothermal and wind electricity production (there is no production of wind energy in Slovenia yet but there is a feed-in tariff for it).
- The feed-in is not limited in time but is reduced over time.
- The level of the price/premium for the producers that are qualified to be in feed-in-tariff system is reduced for 5% after five years from the beginning of the operation of the power plant. Ten years after the beginning of operation of the power plant this price/premium is reduced for 10%.

The RECS-certificates can be issued on top of the fixed feed-in premium, Fig. 2. The producer receives the RECS certificate that is tradable and that he can sell and/or redeem. For

the moment no qualified producer that receives the price/premium according to the feed-in tariff is involved in the RECS system, so RECS certificates are issued, traded and redeemed only for large hydro power plants which are not subsidized. The physical part can be sold on the market but in practice is mostly sold to the TSO or distribution system operator (it depends on the grid on which power plant is connected) together with the greenness at the price defined in feed-in tariff system.

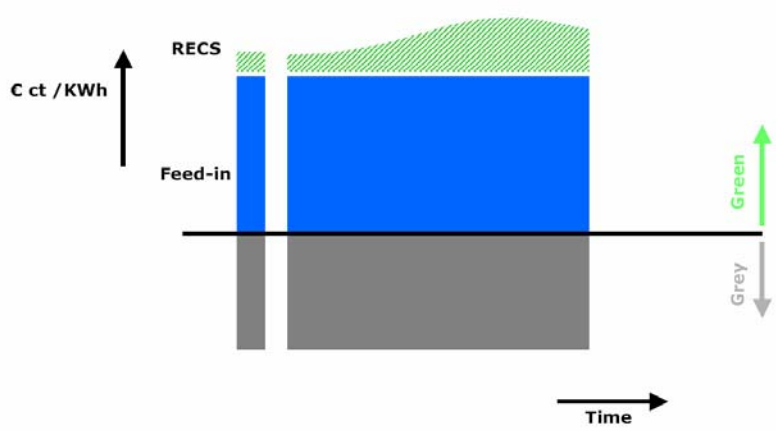

Fig. 2 Example of RES-E subsidies in Slovenia

6.3 RECS System

System RECS is the first international system that enables separation of environmental benefit of RES-E from the electricity itself and its representation in RECS certificates. Trading with certificates is performed separately and independently from electricity and in the same way as trading with other goods. In an open and transparent system none of the participants has a dominating position. The organization behind it, RECS International, is the largest international association of more than 115 energy companies from 18 different countries. Among the RECS-I members are all the most important European energy companies, among others also Verbund AG / APT, RWE Trading GmbH, E.On Energie AG, Vattenfall Europe Trading GmbH, Endesa, Iberdrola Generacion S.A.U., EDF, Enel Trade S.p.A. and Shell Trading International Ltd.. The association promotes international trading with energy certificates from RES-E and promotes the use of renewable energy by making its environmental benefits tradable separately from the physical energy flow and under internationally harmonized rules.

In a new RECS-I member country, first a National Board of RECS is formed that oversees the operation of RECS in the country. Through their national representative they participate in RECS-I. Each member country must also appoint an Issuing Body, choose electronic database for certificate issue, transfer and redemption, and appoint an Auditing Body to inspect and verify the plant certification. Each power plant in the RECS system must have a Renewable Energy Declaration that lists all production-relevant information on the plant, such as technology,

energy source, date of commissioning, financial support received and many others, and has to be renewed every five years.

The RECS-I sister organization, the Association of Issuing Bodies (AIB), is on the other hand in charge of development and uninterrupted operation of RECS system and cooperates closely with RECS-I. AIB and RECS-I collaborate also with other international trade associations, e.g. Eurelectric, as well as with European Commission and the national governments.

In Slovenia, RECS system has been set up in 2002. Although the system is fairly new, the Slovenian RECS certificates are already traded internationally. In Slovenia, they serve as a cornerstone for RES-E retail market where a product was introduced under the brand name of »Modra energija«. The Energy Agency of Slovenia (AGEN-RS) was appointed the Issuing Body in Slovenia. It is responsible for issuing, transfer and redemption of RECS certificates, supervises harmonization of Slovenian system with the International RECS standards and is taking care of system reliability by approving Renewable Energy Declarations of the individual power plants. Their verification as RECS Auditing Body in Slovenia is performed by TÜV Sava Bayern G.m.b.H. from Germany. At the time, the only member of RECS International in Slovenia is HSE d.o.o.

6.4 Trading with Green Certificates

First of all, trade with green certificates is in many ways similar to the wholesale market with electricity and needs to be distinguished from sales of RES-E retail products usually marketed under different brand names (OK Power, TÜV, Eugene, Modra energija, 0,0,0,0), similar to retail electricity market. When there is no obligatory market for RES-E in a country the certificates are purchased from sellers or producers mostly by suppliers of electricity. They use green certificates to form different RES-E products and market them to end consumers.

By purchasing a green certificate, a buyer ensures that RES-E is produced somewhere in Europe and is willing to pay for this. With the certificate the sellers of RES-E assure their buyers of internationally supervised origin of RES-E and prevent double-selling of renewable energy. National Issuing Body is keeping a record of quantity of RES-E produced in each certified power plant and of the respective numbers of issued, transferred and redeemed certificates.

Trading with the environmental benefit that green certificates embody is performed completely independently from energy trading, mostly through bilateral agreements. The certificates are traded for the past time periods because to issue the certificate, the RES-E has to be already produced. In contrast, electricity is always traded for the future time period, usually from one day until a few years in advance, since it needs to be produced and consumed at the same time, while green certificates can be valid up to several years.

A life cycle of a green certificate consists of the following phases: issuing, trading and redemption. Certificates are issued in electronic form, so the transfer of the certificate means merely their transfer from one trading account in the digital certificate data base to another. When the certificate is redeemed it is transferred to a separate, so-called End Account. With this transfer, the environmental benefit which the certificate is related to is used up and can not be sold again. That is why the certificates are effective and transparent way for energy suppliers to

enhance the “greenness” of their portfolio. The certificate is usually redeemed or used up when the buyer claims financial support for RES-E in his country or forms one of the products RES-E and delivers it to the consumer.

Fig. 3 shows separate trading paths of green certificates (e.g. RECS) and of electricity. For every single MWh of RES-E, the environmental benefit is captured in a certificate and separated with the issue of the certificate. Electricity and certificates are the traded on separate markets. A supplier can purchase the certificate and electricity from different sellers, and combine them to form the RES-E product – “dye” the energy green.

6.5 Retail Market with RES-E

In the retail market, green certificates can be used as the assurance of the RES-E end-products’ quality, either directly or through energy labels. Since there is no organized international retail market, the sales usually entail bilateral contract between a supplier of RES-E and an end buyer or consumer. The sales procedures differ in different countries and companies, so the retail market with RES-E is quite fragmented. Energy labels which the companies use to as quality assurance for their RES-E products are not harmonized, and often not even comparable. The standardization of European energy labels is the aim of the international association Eugene 0.

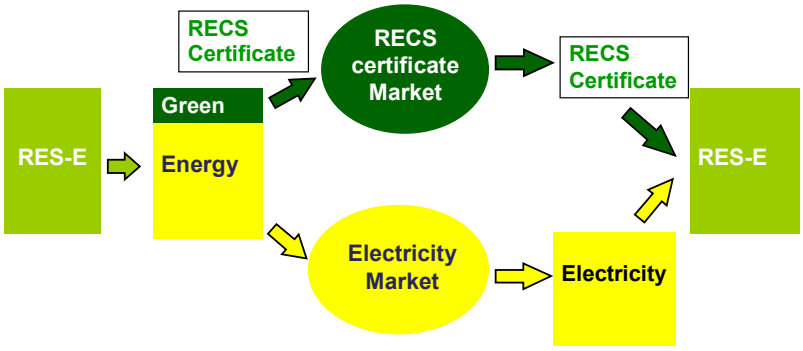

Fig. 3: The RES-E trading path

In Slovenia, only voluntary market with RES-E exists, which the government does not regulate. There is no regulation in place that obliges suppliers to redeem GoO (or RECS certificates) when delivering green products to the customer. Supply of imported renewable electricity is possible via the RECS interface system, but there is no regulation in place that audits this. At the same time, there is no legislation that demands redemption of RECS-certificates or GoO to prove to the consumer that electricity supplied really originates from a renewable source. Since the market just started in 2005, the national voluntary market is small and has a volume of approximately 30 GWh per year. As we will see, RECS certificates are used as a base for a major label at national voluntary market “Modra energija” that was developed by HSE as a supplier.

For a potential buyer of RES-E retail product, the benefits of its use are of primary consideration. Namely, the RES-E is more expensive than usual »grey« electricity, as it has higher quality and a verified origin. The reasons for purchasing RES-E at the retail market differ among companies and countries according to their national legislation. While individual buyers mostly decide for RES-E out of their environmental consciousness, commercial buyers often see this as a chance to improve their public reputation and as a positive promotion of their activities. Proper and innovative design of RES-E products structure can also influence the demand on the retail market. The most important property of a RES-E product, aside from its price, is its composition of RES-E share. Two of the basic methods of RES-E products formation are shown in Fig. 4:

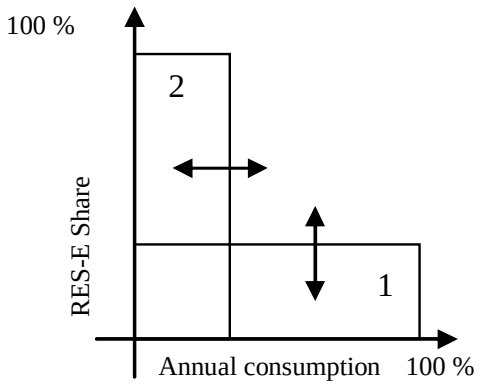

Fig. 4: Two ways to form retail RES-E products

- **Method 1:** The supplier offers a limited number of products, each comprising a different share of RES-E to limit the extent of market fragmentation. The shares of RES-E are usually discrete (example: 10 %, 25 %, 50 %, or 100 %). The product can also differ in the type of RES used and its share in the product's composition. The buyer then purchases one of the products in the amount of his entire yearly electricity consumption. The downside of this method is that while the palette of products is necessarily limited, it contributes to fragmentation of the market and can appear confusing to the buyer.
- **Method 2:** In a simpler approach, the supplier offers only one product with 100 % of RES-E. The buyer than chooses the share in his yearly electricity consumption to be covered by this product. Since in a nascent market, a simpler palette of products is usually preferred, this method was chosen for its simplicity and effectiveness in Slovenian RES-E market.

The retail market with RES-E emerges when the suppliers begin to advertise their RES-E products and offer them on the market. The significance of forming a RES-E retail market on the national level is in raising the individual and public awareness of the importance of RES-E and to stimulate the use of RES-E, since the consumer can finally choose among different »colors« of electricity. The sellers focus on the chosen target groups of buyers to which they tailor the approach and try to present the product according to their needs. Contrary to the wholesale market with green certificates, a comprehensive marketing communication with the buyers is necessary instead of a simple supply contract.

6.6 Slovenian experience with RES-E retail market

The RES-E retail market emerged in Slovenia in 2005. There is one major label on national voluntary market for RES-E in Slovenia, “Modra energija” and two minor local labels: “Zelena energija” and “Zelena elektrika”. These labels were developed by different companies and are not supervised by the government. The environmental NGO’s are not involved in this but they support the “Modra energija” in the voluntary market. While the label “Modra energija” is based on issuing and redemption of adequate quantity of RECS certificates, other two labels are not based on RECS or GoOs.

Following the example of some EU countries, the partners of the »Modra energija« project, namely HSE in cooperation with several distribution companies, have been the first ones to offer a RES-E product nation-wide and in larger quantities. The name of the product, »Modra energija« (ME) (Engl. Blue or Wise Energy) evokes the color of water as the primary energy source of ME, as hydro energy that is also the most important RES in Slovenia. At the same time, the double meaning in the name implies that the purchase of RES-E is wise decision. The brand name was registered for the purposes of trading and sales of ME. The purpose of this project is to stimulate the development of RES-E, to form the RES-E market and to sell RES-E in Slovenia.

At the start, the target consumers for ME were mostly non-household users – companies – but due to the market demand the offer was extended also to household users. Market research show that, the behavior patterns in the field of environmental protection began to emerge in Slovenia, too, although much effort will still be necessary to achieve the European levels of environmental awareness.

The hydro power plants of the HSE Group that produce ME are members of the system RECS International. According to the rigorous international provisions for RES-E production each power plant has a so-called Renewable Energy Declaration, comprising detailed data on produced electricity. The compliance with the RECS measures and European environmental standards is supervised by the Issuing Body and Auditing Body of the RECS Slovenia.

The price for ME was determined based on the results of market research. It is defined as a fixed supplement to the end-consumer electricity price of 1 SIT/kWh (about 0,417 Euro cents/kWh), before VAT. Modra energija is offered to everybody, the suppliers and end users alike. For each MWh of ME sold, HSE guarantees issuing and redemption of one RECS certificate. At the beginning of the year the buyers’ suppliers receive from HSE a statement on the number of RECS certificates redeemed for ME of the past year, certified by the Slovenian Issuing Body.

The share of ME in the yearly electricity consumption that each individual buyer can purchase can range between 10 and 100 %. Part of the ME income is used to cover marketing and other costs, in particular the cost of issuing RECS certificates. Most of the ME income – fixed to 60 % – is collected in a special fund called »Modri sklad«, dedicated specifically to financing of the projects that stimulate RES-E production, development and reconstruction of RES-E production units and research of RES. This will contribute to protection of environment

and health, increased reliability of electricity supply and reduced import dependence of Slovenia.

By development and strengthening of the ME trademark the partners of the ME project are striving to attract high-profile companies as ME buyers. The buyers can use ME to label their products and services. Through purchase of ME, they attest their high environmental awareness and their willingness to contribute to protection of environment. Users of ME are listed on a dedicated web site of Modra energija, 0, that for each buyer also lists the share of ME purchased in their annual energy demand. In addition to the official certificate/diploma certifying the use of a chosen quantity of RES-E in the calendar year, users of ME can also use a special consumer label (»Napaja nas Modra energija«, Engl. We are powered by ME), which indicates the use of ME in products and services of the company, as well as to mark their business premises to assure their immediate recognition as environmentally aware company or individual.

Sales of ME began in January 2005. In the first five months, more than 650 companies and individuals decided to buy ME, bringing the quantity of ME to about 30 GWh in a year. This shows that the retail market with RES-E in Slovenia is growing and that it will continue to develop also in the future.

6.7 Conclusion

International markets with RES-E are continually developing in new ways. The established green certificate market is expanding, featuring new organized market platforms to increase price transparency. In addition to RECS certificates, which have proven to be a good mechanism for selling RES-E, GoOs are gaining on visibility. On the other hand, retail markets for RES-E products based on green certificates differ in many ways, mainly due to differences in national legislations and other characteristics of national electricity markets. The drive to harmonize European energy labels for RES-E (e.g. Eugene) is positive as it leads to transparency of the retail market and facilitates comparison of different RES-E-based energy labels across Europe. This is the first step to expand the RES-E retail market to international level.

As we have seen, the RES-E market in Europe is quickly developing as this area hold many promises for the future. Judging by current results, we can expect quick and efficient development of the RES-E market in Slovenia, helped in part also by the participants in the project of RES-E from Slovenian hydro power plants - Modra energija.

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7 Overview and Recommendation for Renewable Energy Sources in Bosnia and Herzegovina Based on International Experience

Almir Ajanović
Intrade Energy
Zmaja od Bosne 44, 71000 Sarajevo, Bosnia and Herzegovina
Phone: +387 (33) 657 205, FAX: +387 (3) 365-7206, e-mail: almir.ajanovic@intrade.co.ba

Suad Halilčević
Faculty of Electrical Engineering, University of Tuzla
Franjevacka 2, BH-75 000 Tuzla, Bosnia and Herzegovina
Phone: +387 (35) 300 526, FAX: +387 (35) 300 528, e-mail: suadh@untz.ba

Abstract: This paper presents the overview of the Europiean Community and United States of America experiences and their directives regarding the renewable energy sources (RES) and their introduction in to energy network. Through the overview of their practice and legislation we have found the elements of RES promotion and mehanisms that can be conducted to make legislation framework of RES policy in Bosnia and Herzegovina.

7.1 Introduction

Following a vote by the European Parliament in support of increasing the deployment of renewable energy sources, it must be outlined the role that new technologies can play, but also their limits.

It must be referred the need for a global approach to reducing emissions in order to slow climate change. The broad range of coordinated initiatives is requested to reach desired goals. These would include an increase in research and development (R&D), but also the removal of harmful subsidies, the introduction of measures to improve energy efficiency, the widespread use of lower carbon fuels, and use of a new european commission (EU) emissions trading system. We also need to take a closer look at how we plan our infrastructure and how we use our land.

The European Parliament's recommendations, adopted on 29 September, 2005, include a clear increase in the budget for renewables in the Seventh Framework Programme for research (FP7) as compensation for a previous bias in EU energy research programmes.

Recently, the electric energy becomes a task of the municipalities and/or regions. This is specially enhanced into power and energy market circuimstances. Namely, the power market enables a possibility of the regions to solve own energy problems into own framework depending on the specifically demands of consumers and possibilities to enable the different kinds of energy. However, the main electricity sources such as thermal power plants that represent almost 50% of power plants capacity in Bosnia and Herzegovina (B&H), should be competitive at the power market and, at the same time, they should satisfy pollution constraints.

Some aspects of the electric energy policy should stay into the hands of state. That is neccessary because of the appropriate planning and enlargement of the power system. Beside of the care to satisfy the power consumers demands, the appropriate governement body should take into consideration the very important aspects of pollution. That is needed from the local and global point of view. Certainly, effort of each of the municipalities and/or regions (local acting) can give contribution to the overall amelioration of the world pollution picture (global acting). Through the civilization efforts to make environmentaly better world the several conferences (Rio, Kyoto) are held to emphasis the importance of each country to enforce their efforts to protect our Earth.

In that situation, the role of each country and region can be of the great value. The many regional organizations, as for example the EU, set up the pollution constraints to be the conditions for membership in EU. In addition, the produced kWh of the thermal power plants with the high contamination is penalized and because of that, the price of kWh is higher and it can not be competitive at the power market. As a solution for the old thermal power plants that have a high level of pollution and low efficiency level the new technologies in the view of the Pressuried Fluidized Bed Combustion (PFBC), Integrated Generation Combined Cycle (IGCC) and similar, represent the possibility of generators to be competitive at the power market. Certainly, the reparation of the old thermal power plants is very expensive and for that kind of operation the help of the monetary institutions for the undeveloped countries (like Bosnia and Herzegovina) is very important.

Since the energy development, specially the electric energy development, is necessary for development of whole society, many countries try to introduce the different alternatives to satisfy consumer demands and preserve nature. These alternatives encompass rationaly using of energy and RES. In many European countries like Germany, Dutch, France, Spain, Greece, etc., the RES become more and more reality. The RES enable a new power concept that is based on the decentralized energy sources in the view of the solar collectors for generation of heat and electricity, then, micro-turbines, home-size fermenzators and fuel cells. By using of that kind of energy sources the thermal power plants engaging can be reduced and in that way the pollution level can be decreased.

The engaging of the RES should have the great financial support. Because of that, it is questionable a recently introducing of RES into energy systems of the states that have a great reserves of coal and/or oil. Accordingly to the intentions of the many Asian states, specially Chine and India, we can except a great number of the new thermal power plants. That is a not big problem, but thermal power plants that will be build on the old technologies of combustion and transformation of coal into electricity will bring a huge pollution. The similar problems can arise in the other undeveloped countries. This problem needs to be solved on the collaborative

base among rich and undeveloped states. A common interest exists and the global energy network can become the reality taking into account a new technologies of the developed states and energy resources of the undeveloped states. In that way the global environmental Earth's picture can be better.

The purpose of this review is to answer on the question how could we in B&H contribute to the better environmental picture and, at the same time, to satisfy consumer demands and to be competitive on the european energy market. These answers should be the main basis for making the regulatory framework to support RES penetration into existing B&H's energy network.

7.2 EU guides - Energy Policy in the European Union

The fuel shortages and power cuts are rare, but serve as timely reminders that we rely on energy for transport, for heating our homes in winter, cooling them in summer and running our factories, farms and offices. But many energy resources are finite. In addition, energy use is often a source of pollution. Sustainable development means using less fossil fuel more intelligently and developing alternatives.

Some 80% of the energy in EU comes from fossil fuels – oil, natural gas and coal. A significant and increasing proportion of this comes from outside the EU. Dependence on imported oil and gas, which is currently 50%, could rise to 70% by 2030. This will increase the EU vulnerability to supply cuts or higher prices resulting from international crises. It also needs to burn less fossil fuel in order to reverse global warming. The way forward is a combination of energy savings through more efficient energy use, – around 1% of consumption annually, alternative sources – particularly renewable energy sources within the EU, and more international cooperation.

7.2.1 Imports remain essential

The EU keeps strategic stocks of fuel to reduce its vulnerability to problems on world markets, but long-term security of supply also means ensuring the EU is not over-dependent on a few countries for supplies, or that dependence is compensated for by close co-operation. A close energy dialogue is developing as a result with Russia, a major source of fossil fuels and potentially of electricity. Cooperation with energy trading partners, and notably developing or emerging economies, includes investment and transfer of knowledge in production and transport because working together for a free flow of gas, oil and power can be mutually beneficial.

The EU and 11 countries of southeast Europe in late 2004 agreed to set up an Energy Community in which rules on energy will be the same everywhere. This will be good for security of supply because interconnections to the EU sources of supply often pass through these countries. It will also make markets more efficient. This will help lower the price of power

supplies throughout this area and lead to a release of government funds currently used to subsidise all power prices to provide targeted assistance for those who really need it.

7.2.2 Changing the fuel mix

Even so, to reduce dependence on imports and cut pollution, the EU must become a low-carbon economy using less fossil fuel in industry, transport and the home, and making use of RES to generate electricity, heat or cool buildings, and fuel transport, particularly cars. This presupposes an ambitious switch to wind (particularly offshore wind), biomass, hydro and solar power and bio-fuels from organic matter. The following step will be to become a hydrogen economy. A European Hydrogen and Fuel Cell Technology Platform is drafting a blueprint for the eventual transition.

7.2.3 Caring for the environment

Caps on the amount of emissions of carbon dioxide (CO_2) into the atmosphere now apply to EU industry. Companies who exceed their emissions allowance trade with others who have not used up all their allowance. This will encourage more efficient energy use, pollution reducing, and keeping the promises of the EU that have made in the Kyoto Protocol on climate change in to aim to reverse the global warming. There are three ways to reduce pollution:

- to apply the new technology regarding thermal power plants,
- to decrease the energy intensity, and
- to introduce the RES.

7.2.4 Saving energy by using it more efficiently and intelligently

Another way in which the EU backs more efficient fuel use is by promoting the use of 'co-generation'. Gas-fired co-generation plants produce both electricity and heat, mainly in the form of steam. This maximises the use of the gas and it is environmentally friendly because gas produces less CO_2 than other fossil fuels.

Energy is also saved through energy performance standards for new buildings and those being renovated, requiring boilers and air-conditioning to be inspected regularly and buildings to have energy certificates. Standards like these have the potential to cut 25% of the demand for air-conditioning which will be doubled in 2020.

Transport that is more efficient is equally crucial: more people and freight should travel by rail, and better use should be made of public and private transport. This means getting more kilometres to the litre, better traffic management and better urban planning. Traffic jams and commuting waste fuel and vehicle exhausts pollute. The EU hopes that bio-fuels (from organic matter) will provide 5.75% of total energy consumption by 2010. The Commission believes it should be possible to replace 20% of the oil we use with bio-fuels by 2020.

Technology will play a key role in using energy more rationally. The EU is spending €200 million from its *Intelligent Energy for Europe* programme between 2003 and 2006 to support research into energy saving, energy efficiency, renewable energies and the energy-related aspects of transport. The focus is on research programmes that help strengthen security of supply, fight climate change and make industry more competitive.

The single energy market

A competitive energy market helps efficient energy use. In the past, national gas and electricity markets were separate 'islands' within the EU, where supply and distribution were in the hands of monopolies. Now, markets have been opened up to competition and national borders in energy markets are disappearing, though the European Commission would like to see even faster progress.

The EU facilitates competition with funding to connect isolated networks and improve cross-border interconnections, both within the EU and with supplier countries. For their part, all suppliers have guarantees under single energy market rules that they can have access to the distribution grid and pipeline networks of other EU countries and that they will pay a fair price for access. All businesses and many consumers are already free to choose their own supplier of gas and electricity. All other consumers will be by mid-2007. The additional competition comes with additional protection. There are safeguards to protect consumers against their lights going out or their heating going cold. These ensure that cost cutting by competing suppliers does not result in under-investment, that consumer in remote areas or on low incomes are not regarded as too small or too far away to bother about, and that there will always be someone to step in seamlessly if a supplier goes out of business.

7.2.5 Framework Of EU RES Legislation

Through the further text it will be presented some of the EU activities and directives in to aim to drive the RES penetration and to shaped it into appropriate legislative framework.

- Opinion of the European Economic and Social Committee on a 'Proposal for a Directive of the European Parliament and of the Council concerning measures to safeguard security of electricity supply and infrastructure investment'(COM(2003) 740 final — 2003/0301 (COD)) , Official Journal C 120 , 20/05/2005 P. 0119 – 0122

- 2005/231/EC: Council Decision of 7 March 2005 authorising Sweden to apply a reduced rate of taxation to electricity consumed by households and service sector companies situated in certain areas in the north of Sweden in accordance with Article 19 of Directive 2003/96/EC, Official Journal L 072 , 18/03/2005 P. 0027 – 0028

- Information about the signature of a decision of the Management entities under the Agreement between the Government of the United States of America and the European Community on the coordination of energy-efficient labelling programmes for office equipment on the revision of Annex C part II, defining monitor specifications, Official Journal C 037 , 12/02/2005 P. 0002 – 0002

- Communication from the Commission to the Council and the European Parliament – The share of renewable energy in the EU – Commission Report in accordance with Article 3 of Directive 2001/77/EC, evaluation of the effect of legislative instruments and other Community policies on the development of the contribution of renewable energy sources in the EU and proposals for concrete actions {SEC(2004) 547}/* COM/2004/0366 final */

- Commission opinion in accordance with point (c) of the third subparagraph of Article 251(2) of the EC Treaty on the European Parliament's amendments to the common position of the Council on the proposal for a directive of the European Parliament and of the Council on the promotion of electricity from renewable energy sources in the internal electricity market amending the proposal from the Commission in accordance with Article 250(2) of the EC Treaty/* COM/2001/0445 final - COD 2000/0116 */

- Amended proposal for a Directive of the European Parliament and of the Council on the promotion of electricity from renewable energy sources in the internal electricity market/* COM/2001/0884 final - COD 2000/0116 */ , Official Journal C 154 E , 29/05/2001 P. 0089 – 0103

On Wednesday, 10th May 2005, the European Commission adopted a proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the promotion of electricity from renewable energy sources in the European Union's internal electricity market.

The proposal of this directive encompasses the follow items:

7.2.6 The strategic objective of the proposal

- This proposal is a response to the Energy Council's invitation of 11 May 1999 to submit a concrete proposal for a Community framework on access of electricity from renewable energy sources to the internal market. The European Parliament has likewise in it is resolutions on electricity from renewable energy sources of 26 May 1998 and of 30 March 2000 asked for a Commission proposal in this area.
- The strategic objective of the proposal is to create a framework for the medium-term significant increase of renewable sourced electricity in the EU and to facilitate its access to the internal electricity market. This proposal will offer regulatory certainty, while at the same time respecting the principle of subsidiarity by providing for a wide degree of autonomy to each Member State to allow their particular circumstances to be taken into account.
- Promotion of electricity from RES is a high Community priority. The 1997 White Paper on RES highlighted the key role of renewables in terms of security of supply, employment and the environment,
- It is suggested an indicative target of doubling the share of renewable energy sources from 6 % to 12 % in the energy balance in the EU by 2010. This objective was endorsed by the Council in 1998. As concerns in particular the environmental aspects, the

increased use of electricity from RES would also constitute an important part of the actions which will be necessary in order to meet the commitments to reduce greenhouse gas emissions made by the EU in Kyoto (but certainly not the only one. Other possibilities, equally important, include energy efficiency, fuel mix etc.)

- In the White paper this 12 % share of total renewable energy sources in the gross inland energy consumption has been translated into a specific share for consumption of electricity (= 22,1%) produced from RES including the large scale of hydro plants.

7.2.7 The principles of the proposal

The proposal obliges Member States to establish individual targets for future consumption of electricity from renewable energy sources (RES-E)

- The proposal stipulates that the Commission monitors the compliance of the national targets with the global Community objective of 12 %, the specific objective for consumption of RES-E and the Community climate change commitments. In that context, the Commission will have an obligation to propose amendments to the national objectives if they are inconsistent with the Community objectives.
- The proposal abstains from proposing a harmonised Community wide support system for electricity from renewable energy sources. However, the proposal obliges the Commission to make if necessary a proposal for such a harmonised support system within 5 years, taking into account the experiences gained in Member States with the operation of the different national support systems. This will be done on the basis of a Commission report assessing the various support systems in favour of electricity production from renewable as well as conventional energy sources.
- The proposal confirms the application of the State aid rules of the Treaty, to prevent overcompensation of particular producers of green electricity to an extent contrary to the Community interest.

7.2.8 Other technical issues to promote RES-E

As concerns technical issues, the approach supported by the Commission in the past will be maintained. The proposal obliges Member States to

- assure priority access for RES-E
- to assure that certification of RES-E is both accurate and reliable;
- to streamline and expedite authorisation procedures applicable to installation of generation plants for green electricity.
- Also, Member States will have to assure that the calculation of costs of connecting new producers of RES-E should be transparent and non-discriminatory.

7.3 Legislation Affecting the Renewable Energy Marketplace in USA

The question of RES through their legislation in USA has conducted through the several phases. It is understandable process due to technical-economic reasons. In any case, it can be a good way for Bosnian's legislation obligations of RES. The further text brings the USA's historical several steps to shape the RES legislation and to improve their penetration in to energy network.

7.3.1 The Economic Security and Recovery Act

This act produced in 2002, includes a two-year extension of the production tax credit (PTC) for new wind, closed-loop biomass, and poultry waste facilities. The production tax credit, created originally in the USA Energy Policy Act of 1992, provided an inflation-adjusted tax credit of 1.5 cents per KWh for electricity generated from qualifying projects. Under the new law, the production tax credit is now extended retroactively from the end of 2001.

7.3.2 The Energy Tax Act

Residential energy (income) tax credits for solar and wind energy equipment expenditures: 30 percent of the first $2,000 and 20 percent of the next $8,000. Business energy tax credit: 10 percent for investments in solar, wind, geothermal, and ocean thermal technologies; (in addition to standard 10 percent investment tax credit available on all types of equipment, except for property which also served as structural components, such as some types of solar collectors, e.g., roof panels). In sum, investors were eligible to receive income tax credits of up to 25 percent of the cost of the technology. Percentage depletion for geothermal deposits: depletion allowance rate of 22 percent for first period of application in duration of 5 years and 15 percent after that.

7.3.3 The crude oil windfall profits tax act (WPT)

Increased the State's residential energy tax credits for solar, wind, and geothermal technologies from 30 percent to 40 percent of the first $10,000 in expenditures. Increased the State's business energy tax credit for solar, wind, geothermal, and ocean thermal technologies from 10 percent to 15 percent, and extended the credits for a period of the 3 years. Expanded and liberalized the tax credit for equipment that converted biomass into a synthetic fuel, burned the synthetic fuel, or used the biomass as a fuel. Allowed tax-exempt interest on industrial development bonds for the development of solid waste to energy producing facilities, for hydroelectric facilities, and for facilities for producing renewable energy.

7.3.4 The Economic Recovery Tax Act

Allowed accelerated depreciation of capital (five years for most renewable energy-related equipment), known as the Accelerated Cost Recovery System (ACRS); public utility property was not eligible. Provided for a 25 percent tax credit against the income tax for incremental expenditures on research and development.

7.3.5 The Tax Equity and Fiscal Responsibility Act

Canceled further accelerations in ACRS mandated by State agency of training and administration, and provided for a basis adjustment provision which reduced the cost basis for purposes of ACRS by the full amount of any regular tax credits, energy tax credit and rehabilitation tax credit.

7.3.6 The Termination of Energy Tax Credits

State's energy tax credits terminated for the following categories of non-renewable energy property: alternative energy property such as synthetic fuels equipment and recycling equipment; equipment for producing gas from geo-pressurized brine; shale oil equipment; and cogeneration equipment.

7.3.7 The Tax Reform Act

Repealed the standard 10 percent investment tax credit. Eliminated the tax-free status of municipal solid waste power-plants financed with industrial development bonds, reduced accelerated depreciation, and eliminated the 10 percent tax credit. Extended the WPT business taking into account the energy tax credit for solar property through 1988 at the rates of 15 percent for 1986, 12 percent for 1987, and 10 percent for 1988; for geothermal property through 1988 at the rates of 15 percent for 1986, and 10 percent for 1987 and 1988; for ocean thermal property through 1988 at the rate of 15 percent; and for biomass property through 1987 at the rates of 15 percent for 1986, and 10 percent for 1987. (The business energy tax credit for wind systems was not extended and, consequently, expired on December 31, 1985.) Public utility property became eligible for accelerated depreciation.

7.3.8 The Energy Policy Act

Established a permanent 10 percent business energy tax credit for investments in solar and geothermal equipment. Established a 10-year, 1.5 cents per kWh production tax credit (PTC) for privately owned as well as investor-owned wind projects and biomass plants using dedicated crops (closed-loop) brought on-line between 1994 and 1993, respectively, and June 30, 1999. Instituted the Renewable Energy Production Incentive, which provides 1.5 cents per kWh incentive, subject to annual congressional appropriations, for generation from biomass (except

municipal solid waste), geothermal (except dry steam), wind and solar from tax exempt publicly owned utilities and rural cooperatives. Indefinitely extended the 10 percent business energy tax credit for solar and geothermal projects.

7.3.9 Tax Relief Extension Act

Extends and modifies the production tax credit for electricity produced by wind and closed-loop biomass facilities. The tax credit is expanded to include poultry waste facilities, including those that are government-owned. All three types of facilities are qualified if placed in service before January 1, 2002. Poultry waste facilities must have been in service after 1999. A nonrefundable tax credit of 20 percent is available for incremental research expenses paid or incurred in a trade or business. The residential energy credit provided a credit (offset) against tax due for a portion of taxpayer expenditures for energy conservation and renewable energy sources. The general business credit is a limited nonrefundable credit (offset) against income tax that is claimed after all other nonrefundable credits.

7.4 The Proposed Measures for Legal Framework Of RES Installations in Bosnia and Herzegovina

The Bosnian's RES legislation regarding its penetration in the own energy network, taking into account the experiences of the other EU countries and US RES legislation should follow the feed-in tariff model. The main points of the legal framework for RES installations in Bosnia and Herzegovina should take into account the following:

- RES installations should not to participate in the electricity market. RES should be priority dispatched and their energy should be sold at fixed tariffs (market price plus premium).
- Energy should be paid differently taking into account the geographical situations of the Bosnian's regions.

The financing of RES installations in Bosnia and Herzegovina should be implemented through the appropriate operational framework programme of the Ministry of Energy and Industry (MEI). The special secretariat of the MEI should operate in the following tasks:

- Creating and publishing the criteria for participation in the programme and evaluation of the proposals,
- Administration and monitoring of the projects of the programme,
- Control of the actions for their validity according to EU and national laws.

All actions that need to be conducted through this program should take into consideration the following objectives:

- Diversification of energy sources and reduction of the dependence on imported energy sources,
- Decrease of operating cost in industrial and public services sector,

- Environmental protection via the reduction of fuel consumption in order to comply with the Kyoto Commitment protocol,
- Support of local development of RES installation. That will increase of local employment at the RES installation sites,
- Information, support and promotion of RES,
- Expansion of infrastructure in RES,
- Financial incentives for private investments in RES,
- Investment in RES regarding the public sector, like schools, hospitals etc. These investments may consist of:
  - Replacement of conventional fuels infrastructure with natural gas,
  - Energy efficiency measures,
  - RES installations,
  - PV installations on public buildings.

7.4.1 Financing of RES Installations

The following types of RES projects should be financed:

- Installation of RES
  - Installation of Wind or Solar parks, exploitation of geothermal energy and exploitation of biomass for thermal and/or electricity production (Combined Heat and Power).
- Energy Saving Projects
  - Projects that reduce the losses in the industrial process or use part of the rejected energy
- Combined Heat and Power (CHP) projects
  - Update of the existing thermal production infrastructure to produce electricity and vice versa. Installation of CHP units

The financing of RES installations in Bosnia and Herzegovina in the first phase should follow the budget capabilities at the local and state level. For example, the financing of RES installations could be conducted through the next subsidieses:

- Wind Energy 30% of the installation costs
- PV more than 40% of the installation costs
- Geothermal more than 50% of the installation costs
- Biomass energy more than 50% of the installation costs
- Financing of Energy saving programmes more than 40% of the installation costs
- Financing of CHP more than 35% of the installation costs
- Or through the tax reducing on the base of the produced electricity and thermal stream

7.4.2 Standards and Rules

The following standards and rules should be applied to RES installations in Bosnia and Herzegovina:

- Utility Technical Guideline for the connection of distribution generation to the grid forth the technical conditions and requirements for the connection of RES and other distributed generators to the distribution grid. Issues are slow and fast voltage variations, flicker, harmonics, interconnection protection, short circuit level etc., for low and middle voltage installations.
- Distribution Network Code
  - Principles for the operation, maintenance, planning and expansion of the distribution network, determines the jurisdiction and obligation of the Distribution Network Operator. Inevitably, affects distributed generation.
- Other Technical Guidelines
  - Technical policies implemented by engineers in a great variety of network issues, including many affecting distributed generators installations.
- Legal Framework for the Electricity Market
  - Extensive set of legal documents (laws, decrees etc.) that regulate the Bosnia and Herzegovina electricity market after recent deregulation (non-technical).

7.4.3 Licencing Procedures

The licencing procedures for RES installations in Bosnia and Herzegovina should follow:

- Each canton gives the necessary permissions for installing RES in its territory (only for those RES that will be included into the electricity network)
- Regulatory Authority for Energy (Federal Energy Regulatory Commission) approves or not the investment plan and gives permissions for signature to MEI
- MEI signs authorizations.

There is no yet financing of RES installations in B&H through the state's authority. In B&H, the MEI would be the start force in to RES installations. We hope that through the EU's different programs the B&H will start with RES penetration into own energy network. In this way we should make hard job, taking into consideration the standards and rules, information support and promotion of RES, financial incentives for private investments in RES, investment in RES from public sector and funds, etc.

At the fist workshop conducted into University of Tuzla, Faculty of Electrical Engineering, B&H, through the work-package 1, the partners in consortium presented the large possibilities of RES in B&H, such as solar, wind, biomass and small hydro plants. Due to these possibilities the B&H's government and the local communities, in cooperation with scientific community, must take care to make the legal and regulatory framework, by which the processes of RES penetration can be more efficiently and faster. In addition, all actions should be set up in accordance with EU and national laws.

7.5 Conclusion

The specific objectives regarding the RES future in Bosnia and Herzegovina are as follows:

- Implementation and complementation of EU measures designed to develop the renewable energy resource potential.
- Encouragement of the harmonisation of products and equipment in the renewable energy market.
- Supporting of the pilot actions on infrastructures that will increase investor confidence, stimulate the take-up of renewable energy technologies and improve their competitiveness.
- Improving of information, dissemination and co-ordination at the international, EU, national, regional and local level, thereby increasing investor confidence and market penetration.
- Supporting of the targeted actions designed to speed up investment in renewable energy technologies and to increase operational capacity for energy production from renewable energy sources.
- Implementation of the EU renewable energy strategy.
- Advertising support for the RES campaign
- Developing project implementation plans
- Identifying candidates for specific actions such as the "RES communities"
- Collecting data for the virtual B&H information centre for RES
- Developing specific marketing and promotional activities to support RES penetration

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8 Biomass promotional mechanisms, applications and effects in WB Countries

Borut Del Fabbro
Istrabenz Energetski Sistemi, Slovenia
Tumova 5, 5000 Nova Gorica, Slovenia,
Phone: +386 1 33 11 974, FAX: +386 1 33 11 979, e-mail: borut.delfabbro@istrabenz.si

Abstract: The base of a good promotion strategy are well defined goals. The core goal of biomass promotion is an increase of the usage of biomass. The primary challenge is how to design the promotion strategy in such a way to achieve the goal:

Biomass promotion must be designed in accordance to the specifics of each country/ environment. We have to take into account all the specifics, paying special attention to:

- Biomass resources
- National energy policy
- Biomass technology
- Barriers
    - Institutional
    - Awareness & Capacitiy
    - Financial barriers

The barriers that must be addressed in WB countries are:

- Lack of knowledge and awareness about biomass application
- Lack of capital for technology installation
- Limited access to appropriate technology
- Lack of skilled engineers & operators
- Limited availability of appropriate technology for end use – smaller boilers for consumers
- Inadequate demonstration experience – best practice, demonstration projects etc
- Lack of adequate information on biomass resource availability for project developers
- Variation in resource availability data

In the paper it is proposed to overcome the above mentioned barriers by:

- Awareness/capacity building is the key, in which all of stakeholders should be involved. In term of biomass users, it is necessary to provide more information about biomass potential and alternatives for biomass utilization.

- Increasing capacity on the supply side increasing the number and potential of suppliers of equipment, know how, technology, services and fuel; and on the demand side building a strong demand of fuel and requirements for quality equipment and service
- Improving Projects Financially by changing Investors perception on potential of biomass business as investment and by securing additional funds or better financing options

8.1 Introduction

Energy is an essential factor in both livelihoods and industrial activities. An increase in unsuitable use and excessive consumption of energy, however, has caused not only local pollution but also global environmental problems such as global warming. In addition, because fossil fuel energy resources are so limited, if energy security is not fully ensured, such unsustainable energy use may pose a significant threat to economic activities and even to people's lives. To realise sustainable development, a stable energy supply is vital as well as an improvement in energy related environmental problems.

Renewable energy can effectively solve the problems mentioned above, although its promotion has not progressed easily due to economic inefficiency when competing with the traditional energies of oil and natural gas. There are two premises from which to promote renewable energy on a large scale: diversification of the risk to the environment and socio-economic activities; and a stable energy supply. The concept of "sustainable development" has become part of energy policy at various levels, as the importance of renewable energy has come to be increasingly recognised, and as a result, its use has been scrutinised.

Biomass energy, one type of renewable energy, is important from two perspectives: firstly, from the perspective of climate change and energy; and secondly, from the viewpoint of a recycling society.

When it comes to climate change and energy, there is still an excessive demand and a dependence upon traditional biomass energy use in rural areas of the Asia-Pacific region, and biomass energy is superior to other forms of renewable energy sources in its ease of storage and transportation. Since biomass does not necessarily require a national grid for suppliers, the utilisation of biomass energy has the potential to lead to a stable renewable energy supply in the energy mix of Asian countries.

Moreover, the utilisation of methane gas (biogas) from animal dung—such as through small-scale household biogas plants—could lead to a decrease in methane gas emissions, a major contributor to global warming.

Secondly, with regard to a recycling society, large amounts of agricultural products are produced in the western Balkans together with woody biomass, along with large amounts of agricultural residue.

Furthermore, biomass energy has the following advantages: 1) unaffected by natural conditions, 2) energy combined efficiency by producing heat and electricity, and 3) labour absorption in energy resource production, superior to other forms of renewable energy. In spite of the advantages of biomass energy, various barriers such initial high costs, sometimes insufficient or inefficient biomass energy resources and insufficient market development must be solved for the use of biomass energy to progress.

8.2 Key points

8.2.1 The goal of biomass promotion is to increase the usage of biomass as an energy source.

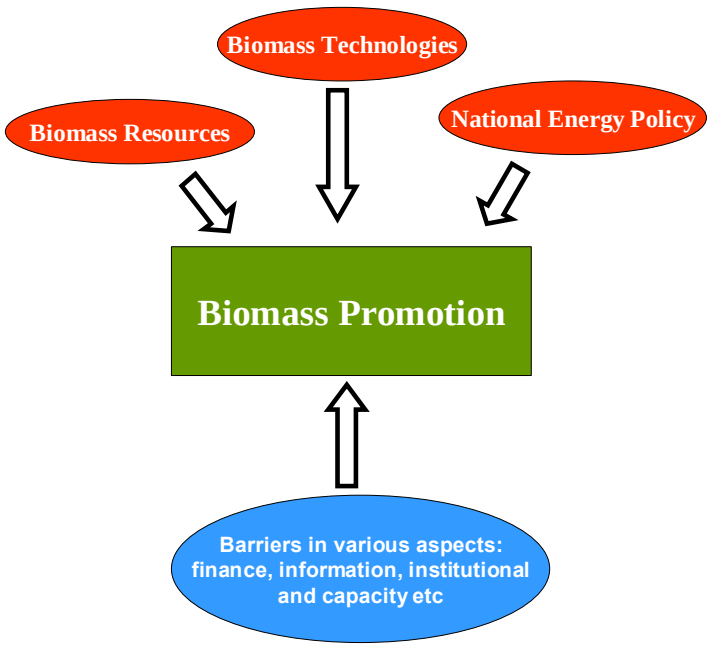
The base of a good promotion strategy are well defined goals. It cannot be overemphasized that the goal of biomass promotion it is not the promotion itself nor only raising the awareness or knowledge about biomass. The core goal of biomass promotion is an increase of the usage of biomass. This can be done in various ways and through various mechanisms. The primary challenge is how to design the promotion strategy in such a way to achieve the goal:

- What measures to undertake?
- What factors to take into account?
- What to focus on?

Biomass promotion must be designed in accordance to the specifics of each country/ environment. We have to take into account all the specifics, paying special attention to:

- the biomass resources that are present in a country (wood from forests, wood processing waste, pellet and briquettes production or import possibilities
- national energy policy – the promotion of biomass should not be in collision with the national energy policy, quite the opposite: it should be perfectly in line with it in order to achieve synergies
- biomass technology – all the promotion measures must be in line with available and mature technology
- barriers that are present and that have to be overcome

Figure 1: Schematic presentation of different factor impacting on the formation of a feasible biomass promotion strategy



8.2.2 Promotion of biomass energy must focus on barriers elimination

The most crucial point in biomass promotion is the elimination of barriers that obstacle higher biomass penetration. These barriers are present between the supply side and resources on side and the demand side on the other side. They are in the form of absence of knowledge, information, awareness, financial stimulations or of some other nature.

The resources are intended as:

- biomass primary material – wood logs, industry waste etc.
- biomass products – wood pellets, briquettes

The supply side is intended as:

- technology providers – equipment for biomass utilisation and biomass production
- service providers – engineering and maintenance providers

On the demand side there are households, companies and government that are all potential users of biomass, but are not using it due to some barriers. These barriers are the primary target of the promotion strategy.

8.3 Incentive schemes for promotion of electricity from biomass

The policy instruments that are in place in the different Member States to promote generation of electricity from renewable sources (and, then, biomass) are all based on two main principles. The instruments either affects the supply or the demand of renewable electricity, and the focus either on the production of electricity or on the installed capacity of renewable electricity plants.

Within this categorisation, there are basically three main instruments to promote renewable electricity. These instruments are feed-in tariffs, quota obligations in combination with a green certificate system, and tendering/bidding schemes. Besides the three main instruments there are complementary mechanisms possible, like investment subsidies and fiscal measures.

8.3.1 Feed-in tariffs

Feed-in tariffs are a commonly used instrument for the promotion of renewable electricity production. The term feed-in tariff is used both for a regulatory, minimum guaranteed price per unit of produced electricity to be paid to the producer, as well as for a premium in addition to market electricity prices. Regulatory measures are usually applied to impose an obligation on electricity utilities to pay the (independent) power producer a price as specified by the government. The tariff may be supplemented with subsidies from the state. The level of the tariff is commonly set for a number of years to give investors security on income for a substantial part of the project lifetime.

Many different adaptations of the instrument are applied. A feed-in tariff can be based on the avoided cost of the utility that has the purchase obligation, or on the end price to the consumer. However, the level of the tariff need not have any direct relation with either cost or price, but can be chosen at a level to motivate investors for green power production.

Factors for success

A successful feed-in policy includes design features that eliminate risk for potential renewable investors. These include long-term contracts (15-20 years), guaranteed buyers (must-take or default contract terms), and a price that offers a reasonable rate of return for the producer. Other features of a well-designed feed-in policy are that it should be simple, allow a variety of renewable resource generation types of participate, have low administrative costs, and be flexible enough to capture market and cost efficiencies as they evolve. Finally, perhaps one of the most important factors for the success of a feed-in policy is that it is integrated into long-term planning with other policy options, such as favorable tax treatment, that create a stable environment for a renewable industry to thrive.

8.3.2 Renewable Portfolio Standards

Both feed-in laws and RPS are government-mandated policies designed to create a market for renewable energy. However, unlike the feed-in law, the RPS is a quantity-based policy that establishes a target quantity of renewable energy to be included in the electricity mix by a specific date. An RPS also specifies who is responsible for obtaining that renewable energy and specifies penalties for non-compliance. As currently implemented, RPS policies tend to be silent on price and leave that to be determined by the market.

Under an RPS, a country or state requires all utilities or retail suppliers to purchase a certain amount of renewable energy. Many design variations to an RPS are possible, and this policy may be used in conjunction with other policies such as a tendering auction, as in the UK NFFO, or a public benefits fund. The RPS is an increasingly popular form of support for renewable energy, with several developed nations considering phasing out their feed-in tariffs in favour of an RPS based mechanism as they institute competitive market systems into the electricity sector.

Factors for Success

From the limited experience to date, there are several design factors that seem to dictate the success of an RPS in spurring new renewable development. Some of the key factors present in a successful RPS include appropriate target levels, renewable targets that are long lasting and increase over time, strong and effective enforcement with appropriate penalty levels, and output based generation targets. It is also important to have credit-worthy buyers in place to allow long-term contracts and renewable energy financing. If credit-worthy buyers are not in place, the presence of merchant renewables and/or low-cost renewables, combined with sufficient lead-time and buyers with long-term obligations, can help overcome this problem. Finally, the creation of a certificate-based trading platform to assist liable parties in finding

eligible renewable generation helps lower the administrative costs of compliance and helps parties meet their compliance targets.

8.3.2.1 Quota obligations/green certificates

Quota obligations are used to impose a minimum production or consumption of electricity from renewable energy sources. The government sets the framework within which the market has to produce, sell, or distribute a certain amount of energy from renewable sources. The obligation is imposed on consumption (often through distribution companies) or production. Governments may choose to establish 'technology bands' in order to protect technologies from strong competition by lower cost options. The quota can usually be traded between companies to avoid market distortions.

A tradable green certificate is needed for this system. These green certificates provide an accounting system to register production, authenticate the source of electricity, and to verify whether demand has been met.

8.3.3 Tendering Policies

For the purpose of this paper, we define a tendering policy as one that uses government-overseen competitive processes to meet a planning target with long-term power purchase agreements with renewable generators. Tendering policies are a variation of feed-in laws and renewable portfolio standards, the key difference being that the price and the eligible projects are selected through a competitive bidding process. Like feed-in laws, tendering policies guarantee to purchase the output of a qualifying renewable energy facility at a specified price for a specified period of time. The difference between these two policies is how the price is set, and which renewable.

8.3.3.1 Bidding systems

Bidding procedures can be used to select beneficiaries for investment support or production support (such as through feed-in-tariffs), or for other limited rights- such as sites for wind energy. Potential investors or producers have to compete through a competitive bidding system. The criteria for the evaluation of the bids are set before each bidding round. The government decides on the desired level of electricity from each of the renewable sources, their growth rate over time, and the level of long-term price security offered to producers over time. The bidding is accompanied by an obligation on the part of electricity providers to purchase a certain amount of electricity from renewable sources at a premium price. The difference between the premium and market price is reimbursed to the electricity provider, and is financed through a non-discriminatory levy on all domestic electricity consumption. In each bidding round the most cost-effective offers will be selected to receive the subsidy. The mechanism therefore leads to the lowest cost options. energy generators can participate. While the feed-in laws set a price and guarantee to purchase the renewable energy output from any eligible facility at that price, a tendering policy uses

competitive bidding to select projects that offer the best price. These projects are then awarded power purchase agreements for their output. Through the competitive bidding process, renewable developers submit proposals to build new renewable generation facilities and indicate the price they would accept for their output. The lowest priced renewable energy projects are then selected with a guarantee to purchase all the output from these projects. As with feed-in laws, this guaranteed power purchase agreement helps reduce investor risk and helps the project secure financing. Also like the feed-in law, the amount of power acquired may depend upon the prices bid (i.e., the cheaper the bid prices, the more that can be purchased). However, this strategy can also be combined with a mandatory quantity and with a ceiling on acceptable bid prices.

8.3.3.2 Investment subsidies

Investment subsidies can help to overcome the barrier of a high initial investment. This type of subsidy is commonly used to stimulate investments in less economical renewable energy

technologies. Investment subsidies are usually 20-50% of eligible investment costs, but in some cases subsidy is given over the total eligible investment sum, however within the limitations of the Community guidelines on State aid for environmental protection. Loans with a low interest rate can also be considered as investment subsidies.

8.3.3.3 Fiscal measures

Some EU countries support renewable electricity by means of the fiscal system. These schemes may take different forms, which range from rebates on general energy taxes, rebates from special emission taxes, proposals for lower VAT rates, tax exemption for green funds, to fiscal attractive depreciation schemes, which must be in line with the Community guidelines on State aid for environmental protection.

It must be said that all of these mechanisms are permitted within the contest of the Renewable

Electricity Directive. Feed-in tariffs are permitted provided that it is demonstrated (as it has been the case for German Law on Renewable Electricity) that they are correctly defined to favour development of renewable technologies without excessive state aid and they are progressively modified (i.e. reduced) to take into account renewable technologies improvement and cost reductions.

In recent years, however, several EU Member States have assessed the possibility of introducing a green certificates mechanism.

8.3.4 Criteria for Analysis of Measures

Whichever measure it is used it must be evaluated with appropriate tools and according to different aspects and criteria.

The most important criteria that must be taken into account by evaluation of the measures are:

- ***Cost Minimization:*** minimizing the cost of generation and maximizing the amount of competition in the renewable energy sector (to the extent this will contribute to minimizing costs)
- ***Price Minimization:*** minimizing the price that is paid for renewables in the marketplace
- ***Maintaining Targets for Renewable Energy:*** ability to establish and meet firm development targets for renewables
- ***Market for Power from Renewable Facilities:*** the creation or maintenance of a sustainable market for purchases of renewable energy that supports the funding of new facilities
- ***Resource Diversity:*** ability of the measure to encourage diversity in renewable energy supply sources
- ***Political Viability:*** the viability of the measure in achieving necessary political support
- ***Local Industry and Manufacturing Development***: ability of the measure to increase local renewable infrastructure and create a local renewable energy manufacturing industry that will have economic development and employment benefits
- ***Compatibility with the Electricity Industry and Regulatory Structure:*** compatibility of measure with the increased competition being introduced into the electricity sector
- ***Measure Stability:*** ability of the measure to create a durable renewable energy industry with access to reasonable financing
- ***Competitive Parity***: ability of the measure to spread the cost of renewable energy fairly and evenly across market participants
- ***Integration:*** ability of the measure to integrate renewable energy into the larger electricity system and the reduce institutional barriers to renewable development
- ***Simplicity:*** the simplicity of measure design, administration and enforcement

No single promotion measure can meet the full range of these objectives. Accordingly, the aim of this paper is not to recommend one form of renewable energy promotion strategy over another.

8.3.5 Implications and Conclusions

There are advantages and disadvantages to each of the renewable energy support policies discussed above. Whether the weight of the evidence suggests one policy over the other depends on the primacy of different possible policy objectives and the political context within which the decisions are being made.

- RPS based mechanisms may hold the best hope for price minimization, allow for the development and maintenance of specific renewable energy targets, and may be more compatible with future electric industry structures.

- Feed-in laws are simpler to administer and enforce, may better ensure resource diversity and local industry infrastructure development, can set the stage for price reductions by nurturing cost reductions, and may be more compatible with the current industry and regulatory structure in the WB countries.
- Tendering policies can be effective as they can help to establish a renewable generation base that can support the RPS. The primary issue with a state supported tendering policy is usually the political will to levy a tax or fee to collect the money to pay the incremental cost of the renewable generation. The design and implementation mechanisms of a tendering policy can be developed in parallel with or after other policy initiatives have been established such as a public benefits fund or RPS.

A final consideration is timing. A feed-in tariff can help develop renewable energy infrastructure more rapidly than either of the other two policies. A tendering strategy is useful for reducing prices but may require an established industry to achieve this economic efficiency goal. An RPS policy can possibly build the industry but experience is limited and suggests it will take more time with an RPS than with a feed-in law if market development is in its infancy.

8.4 Case Slovenia - Overview of biomass promotion in Slovenia

8.4.1.1 Current status

Over half of Slovenia is covered with forests and wooded areas. Wood is an important fuel for space heating, particularly in the residential sector. Forest residues consist of about 359 th MW installations. In the country's wood processing industry there are about 80 wood waste boilers of capacities of greater tha n 1 MWth and a few small municipal wood-fueled district heating plants. Moreover, many rural households and farms use firewood as a fuel source. No energy crops or bio-fuels have been reported as being produced in Slovenia. On the other hand there are 2 MWth of energy from Municipal Digestible waste (biogas plants), 1 MW of Solid Industrial waste and 2 MW of Landfill gas.

8.4.1.2 Biomass Energy Resource Potential

The area of forests in Slovenia has been increasing from year to year. In 1990 it was 1,071,151 ha. It reached 1,111,006 in 1998. On the assumption that for the sake of sustainability only a bout 57% of the total potential can be tapped, the potential amount has been estimated as Qt=27.9 PJ/a. Qt = heat. The potential for biofuels, such as bioethanol and biomethanol, produced by fermentation plants from sugar and cellulose has been calculated as Qt=10.7 PJ/a. Production only uncultivated or marginal land. An estimate for a biogas potential of Qt* = 25.4 PJ has also been made for utilizing waste from farms, people animals and others. However, no explanation has been given as to the absolute level of solid and liquid wastes estimated. There is a suspicion that the full potential through this technological route has not been fully taken into account.

8.4.2 Identified Barriers

The most important barriers identified in Slovenia are as follows:

a) Institutional

- lack of communication and co-operation between the different sectoral ministries dealing with biomass related activities (energy, environment, agriculture and forestry);
- lack of a cross-sectoral energy projects; lack of a strong national focal point to support and promote biomass energy activities

b) Awareness & Capacitiy

- lack of information and awareness of the local communities, industry and consultants on the state of the art technologies and approaches for use of biomass as an energy source;
- lack of capacity and guidelines for preparing feasibility studies and "bankable" project proposals;
- lack of capacity and experience of the local experts to finalise all the other documentation needed to present projects for financing;
- lack of awareness of the end users on the costs, benefits and possible constrains of changing the individual heating systems to district heating;
- lack of information and awareness of the local communities on environmental benefits of increasing the use of biomass as an energy source; strategy and policy/legal framework to promote biomass the social and
- lack of capacity and information of the local communities to assess the sustainability of the wood fuel supply and to organise the local fuel wood market;
- lack of information to determine accurately the specific investment and operational costs of biomass based district heating plants in Slovenia;
- lack of experience and "success stories" of biomass district heating projects in Slovenia;
- lack of trained professionals to promote and support biomass energy activities, and to ensure reliable operation of the new installations; and
- perception of biomass boilers as an environmentally not friendly technology (due to the inefficient and polluting old biomass boilers)

c) Financial barriers

- lack of information about the possible sources of financing;
- high project preparation costs without the assurance of ob actual implementation of them;
- uncertainties on the long term market price of fuel wood and on the final number of the clients that decide to connect themselves into district heating;

- absence of stable, long-term financing mechanisms to support renewable energy projects (the current Government support is dependent on the annual budget preparations, which for long term planning purposes does not provide enough financial assurance);
- weak financial status of the communities and local wood processing companies to apply for commercial credits, although the projects themselves would be financially strong;

8.4.2.1 Investment subsidies

Investment subsidies have proved to be quiet an efficient measure. They focus on the core problem of utilisation of biomass. This is the high investment costs in comparison to fossil fuel utilisation. The Ministry of the Environment, Spatial Planning and Energy offers subsidies for investment projects in the field of RES and RUE, which are available through the Agency for Energy Efficiency and Renewable Energy. The subsidies are calculated in every year's budget and therefore are limited. The subsidy for RES-investments producing heat is normally up to 40% of the eligible costs. Investments in PV, wind energy and biomass for producing electricity in remote areas with no possibility of connection to the electricity network can get a subsidy of up to 40% of the eligible costs. The subsidy can be increased by additional 10 % for SMEs.

8.4.2.2 Granting of credits with lower interest rate

Credit with lower interest rates than commercial credits are another way to address the problem of higher investment costs of biomass utilisation equipment. By lowering the interest rate and by providing better other financing options (longer pay back time, lower transaction costs etc) the initial investment represent a minor burned for the investor and thus increases the attractiveness of biomass.

8.4.2.3 Increase of awareness, knowledge

An increase of awareness and knowledge is trying to be achieved through:

- workshops for specialist from the heating area
- workshops for project designers
- workshops for NGO memebers
- publication of promotion material:
    - information brochures
    - posters
    - web site
- local Energy efficiency offices

8.4.2.4 Demonstration projects

Demonstration projects are a key point in promotion, awareness rising and knowledge dissemination. A few projects have been financed through governmental chemes and they have been used in a demonstration scope by organizing visits to the site and by promotion through TV emissions and by publication of data about them (e.g. consumption, reliability, maintenance etc)

8.4.2.5 Decree for compulsory analysis of usage of biomass in district heating

There are some intentions to pass through the government a decree which would force all communalities to at least evaluate the usage of biomass in district heating. The decree has not been passed yet.

8.4.2.6 Decree for usage of RES in public owned buildings

Similarly a decree for usage of RES in public owned building has also not been passed yet. Such a decree would force all public entities to evaluate and give priority to the usage of RES in their buildings.

8.4.2.7 Green public tenders

Green public tenders are now in the phase to be introduced. They will provide additional funds for communalities and other public entities that will through public tenders acquire biomass equipment or make investments in the RES.

8.4.2.8 Quality standards for wood chips and pellets

Quality standards for pellets and wood chips are being introduced, however have proved of little use since the market with this goods is still in development.

8.4.2.9 Development of biomass market

A web based biomass market place (http://res.borzen.si/DesktopDefault.aspx) has been developed by a para-governmental company Borzen and has been working since 2004.

The main services accessible via the Borzen OVE portal are:

- Trading in various products of wood biomass.
- Free advertising for companies involved in biomass.
- Information on renewable energy sources with an emphasis on biomass.

The portal is freely accessible, and is aimed at companies and individuals working in this market, as well as the general public. Access is controlled only to the trading section, for which you need to register.

The portal has a dual role: access to trading, and providing information. Trading in wood biomass is carried out using a special application, while information is provided in the form of advertisements, links and the posting of news.

The portal comprises:

- FAQ: answers to frequently asked questions connected to biomass.
- RULES contains: Terms and Conditions, Trading Application Manual, Instructions for Advertising, Registration Manual, Catalogue of Products
- DOCUMENTS: this offers access to rules in PDF format and other articles connected to trading, the portal and biomass.
- ADVERTISEMENTS: you can browse through advertisements in connection with peripheral segments of the biomass market (divided up into subgroups “machinery and equipment” and “services”).
- LINKS: links to pages offering further information on renewable energy sources and biomass.

The catalogue of wood biomass products posted on the portal defines the products that are traded within the Biomass Exchange. Product definitions set out the basic characteristics that define an individual product. A pictorial representation of the product is also attached, and this provides a clearer idea for all those that are just becoming familiar with wood biomass. Each traded product is determined with a maximum of five parameters, from which it is possible to deduce its quality, energy value and so forth. The parameters that determine the product’s trading code are divided into five groups:

To use the portal and trading application you do not need any additional hardware or software, but just an ordinary web browser. The services provided by the Biomass Exchange are for the moment entirely free of charge. The project is financed by the Agency of the Republic of Slovenia for Energy Efficiency and Renewable Energy Sources through the project GEF.

8.4.2.10 Increase of taxes on fossil fuels for heating

An additional increase in taxes on fossil fuels has not been performed and will also most probably also not occur due to macroeconomic implications.

8.4.3 Mechanisms and measures – electricity from biomass

Separately we will treat the measures taken in order to stimulate the production of electricity from biomass. There are three main measures that have been undertaken:

- Electricity source certification
- Stimulation of CHP in district heating
- Stability of feed in tariffs for RES

8.4.4 Stability of feed in tariffs for RES

The electricity production with all RES producing electricity listed in the table below is supported trough a feed-in tariff system. This system is foreseen for independent qualified producers from which distribution companies have to buy electricity on fixed prices.

According to the Energy Law which was adopted in 1999 and amended in 2004, the network operators are obliged to purchase electricity from "qualified producers" at prices which are fixed by feed-in tariffs. To benefit from the preferential feed-in tariffs a producer has to obtain the status of a "qualified producer", according to article 29 of the Energy Law:

A producer who generates electricity and thermal energy in an individual production facility with an exceptional/above average efficiency in cogeneration of electricity and thermal energy, or a producer who uses renewable energy resources in a manner which is in accordance with environmental protection standards, may acquire the status of a "qualified producer."

Table 1: The current feed-in tariffs, as stated by the Official Gazette of RS, No. 8, 30.1.2004:

Type of QPP regarding the primary energy source	*Power capacity*	*Uniform annual price (SIT/kWh)*	*Uniform annual premium (SIT/kWh)*
Hydroelectric QPP	up to 1 MW inclusive	14,75 (~ 6,3 €cents)	6,75 (~ 2,9 €cents)
	From 1 MW up to 10 MW inclusive	14,23 (~ 6,0 €cents)	6,23 (~ 2,6 €cents)
Biomass QPP	Up to 1 MW inclusive	16,69 (~ 7,1 €cents)	8,69 (~ 3,7 €cents)
	Above 1 MW	16,17 (~ 6,8 €cents)	8,17 (~ 3,5 €cents)
Wind QPP	Up to 1 MW inclusive	14,55 (~ 6,2 €cents)	6,55 (~ 2,8 €cents)
	Above 1 MW	14,05 (~ 6,0 €cents)	6,05 (~2,7 €cents)
Geothermal QPP		14,05 (~ 6,0 €cents)	6,05 (~ 2,7 €cents)
Photovoltaic	Up to 36 kW inclusive	89,67 (~ 38,0 €cents)	81,67 (~ 34,6 €cents)
	Above 36 kW	15,46 (~ 6,5 €cents)	7,46 (~ 3,2 €cents)
Other QPP		28,97 (~ 12,3 €cents)	20,97 (~ 8,8 €cents)
Combined QPP using RES		16,05 (~ 6,8 €cents)	8,05 (~ 3,4 €cents)
QPP or heating plant using communal waste	Up to 1 MW inclusive	12,74	4,74

		(~ 5,4 €cents)	(~ 2 €cents)
	From 1 MW up to 10 MW inclusive	11,87 (~ 5,0 €cents)	3,87 (~ 1,6 €cents)
Heating plant for district heating	Up to 1 MW inclusive	13,90 (~ 5,9 €cents)	5,90 (~ 2,5 €cents)
	From 1 MW up to 10 MW inclusive	13,38 (~ 5,7 €cents)	5,38 (~ 2,3 €cents)
Industrial heating plant	Up to 1 MW inclusive	12,86 (~ 5,4 €cents)	-

Uniform annual prices and uniform annual premiums do not include VAT. It is foreseen that the prices will be changed once a year with government decree, taking into account the inflation and other relevant factors.

When a qualified producer sells electricity to others than to a network operator he gets paid the uniform annual premium. As visible in the table, there is no preferential price for hydropower plants with a capacity exceeding 10 MW, according to a regulation of the government on feed-in prices of 2002. For other types of plants employing renewables, no upper limit is given. The tariffs are renewed once a year, taking into account inflation and other relevant factors. Further there is an exemption from CO2-emission tax for high efficient cogeneration of electricity and thermal energy connected to the public electricity grid. When biomass or biogas is utilized there is no obligation for payment of CO2 tax.

8.5 Proposals for WB countries

8.5.1 Barriers in WB countries

For a good biomass promotion strategy it is crucial first to identify the most important barriers to a bigger biomass penetration. We have identified quite a few barriers, of which the most important are here under systematically listed.

The barriers that must be addressed in WB countries are:

- Lack of knowledge and awareness about biomass application
- Lack of capital for technology installation
- Limited access to appropriate technology
- Lack of skilled engineers & operators
- Limited availability of appropriate technology for end use – smaller boilers for consumers
- Inadequate demonstration experience – best practice, demonstration projects etc
- Lack of adequate information on biomass resource availability for project developers
- Variation in resource availability data

8.5.2 Focus on stakeholders

The promotion mechanisms must focus on all stakeholders. The overall strategy must be designed in such a way that it covers at least the following stakeholders:

- Local communities through the creation of new jobs and provision of modem heat and hot water supply services to their population;
- Local wood processing companies
- Local farmers and forest owners through increasing the possible market for wood fuel collected from forest thinning and cleaning, the abandoned agricultural land;
- Local consultant companies and NGOs providing expertise and services to promote and implement biomass energy activities; and
- Local firms producing wood biomass boilers and related equipment (secondary beneficiary)

8.5.3 Increase Awareness:

Awareness/capacity building is the key, in which all of stakeholders should be involved. In term of biomass users, it is necessary to provide more information about biomass potential and alternatives for biomass utilization. In addition, those alternatives should be cost effective and practical for various levels of investment. However, offering the information to the prospective users as a first priority is very important, because they have abilities to provide knowledge and experiences to other users as well.

In term of investors, information is required to change their perception on potential of biomass business as investment. Because the biomass business is comparably new and returns on investment are questionable. Thus, long-term perspective should be considered. In addition, a new movement, CDM (Clean Development Mechanism) and carbon trading, is now in focus for many prospective users and investors because it may be an effective mechanism leading to the trans-national investment and technology transfer.

Systematic planning of public relation activities to promote biomass investment is essential. It can be done by:

- Organising public relations events such as road show and open house. These are to deliver information on various options of biomass investment for targeted investor groups at local, state and international levels. Characteristics of the information would be in a concise, clear and practical manner. It may include outstanding investments as potential projects.
- Rearrangement information for raising awareness in biomass utilisation. Due to the lack of concrete information on advantages of biomass over fossil fuel, a future trend of biomass development and benefits towards the environment is considered very important. The investment in biomass can help in reducing environmental externalities and contribute to sustainable development. This can be presented in an integrated aspect of environment and economics such as CDM.
- Providing an updated information on alternatives of biomass utilisation in the regional level in accordance with the prominent trend of renewable energy and the new opportunity of biomass market, like CDM.

8.5.4 Improve Project Financially

In order to rise the usage of biomass it is crucial to increase the economic attractiveness of biomass utilisation projects. This can be done in more, the most appropriate are two of them:

- Change Investors perception on potential of biomass business as investment
- Secure additional funds or better financing options

8.5.4.1 Change Investors perception on potential of biomass business as investment

By changing Investors perception on potential of biomass business as investment we reduce the perception of risk connected with these projects. In these way the required return on investment is lower and consequently the projects can be more readily accepted.

8.5.4.2 Secure additional funds or better financing options

By securing special purpose funds or better financing options for biomass projects we rise the attractiveness of these projects not only in absolute terms but also in comparison to other competitive fossil fuels.

Additional funds can be provided by:

- subsidies,
- capital participation of public entities,
- better financing options.

8.5.4.3 Inform about CDM (Clean Development Mechanism)

Clean Development Mechanism are a very good options for securing additional revenues for bigger biomass projects in West Balkan countries.

All project developers that come from Countries of Kyoto Protocol Annex B countries can take advantage of the CDM mechanism in countries that have ratified the Kyoto protocol.

By the usage of the CDM the investor form a Annex B country can gain additional revenues from the sale of the CO2 certificates, what can result in a substantial increase in project profitability.

8.5.5 Increase Capacity

Increasing capacity means

- on the supply side increasing the number and potential of suppliers of equipment, know how, technology, services and fuel
- on the demand side building a strong demand of fuel and requirements for quality equipment and service

8.5.5.1 Focus on bigger projects that can sustain the supply side also for smaller projects

Small projects are very risky due to the difficulty to sustain the availability in regularity of the supply of fuel and maintenance. With small project the interest of the companies to provide maintenance, spare parts, technology and know how and fuel is quite low. The initial costs and transactions costs are significant and due to quite low turnover they impact a lot on cost of individual service or item.

The solution is to implement a few bigger project, which will stimulate the supply side and will play as a big consumer of biomass. As a consequence the supply of biomass to such a consumer is economically viable and can cover the initial investment costs plus the ongoing costs. Moreover the supplier of technology can cover the initial costs of new technology adoption already with one big project and can implement other project already at marginal cost.

8.5.5.2 Local Industry and Manufacturing Development

Because tendering provides strong and continuous incentives for cost minimization, absent additional policies or an already established renewable industry, it can be difficult for such policies to increase local renewable energy supply infrastructure in order to gain the local economic development and employment benefits of renewable energy. With a continuous incentive to reduce costs, established equipment suppliers and developers are likely to dominate the market, at least initially. Therefore it is important to already have local suppliers established so they can compete. Such ease of market entry is especially important at the initial stages of renewable industry development for less well-financed and smaller players in the renewable energy business.

With regards to manufacturing of renewable energy equipment and components it is recommendable to favour the most established companies that can manufacture parts and components at the least cost.

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9 Authors

Elena Boškov
DMS Power Engineering Ltd
Puškinova 9a, 21000, Novi Sad, Serbia & Montenegro
Phone: +381 21 475 0376 FAX: +381 21 455 865, e-mail: elena.boskov@dmsgroup.co.yu

Dragan Popović
DMS Power Engineering Ltd
Puškinova 9a, 21000, Novi Sad, Serbia & Montenegro
Phone: +381 21 475 0376 FAX: +381 2 129 521, e-mail: dpopov@uns.ns.ac.yu

Maja Božičević Vrhovčak
Faculty of Electrical Engineering and Computing, University of Zagreb,
Unska 3, 10000, Zagreb, Croatia
Phone: +385 1 6129-986, FAX: +385 1 612-9890, e-mail: maja.bozicevic@fer.hr

Andrej Hanžič
University of Maribor, Faculty of Electrical Engineering and Computer Science
Smetanova ulica 17, 2000, Maribor, Slovenia
Phone: +386 2 220 70 56, FAX: +386 2 25 25 481, e-mail: andrej.hanzic@uni-mb.si

Dimityr Popov
Technical University of Sofia
Kliment Ohridski Str. 8, 1000, Sofia, Bulgaria
Phone: +4021 (402) 9433, FAX: +359 (2) 965-2303, e-mail: dpopov@tu-sofia.bg

Reinhard Padinger
Joanneum Research
Elisabethstrasse 5, A-8010 Graz, Austria
Phone: +43 316 876-1333, FAX: +43 316 876-1320,e-mail:reinhard.padinger@joanneum.at

Constantine Karras
Centre for Renawable Energy Sources
19th Marathon Avenue,19009 Pikermi, Greece
Phone: +30 210 6603300, FAX: +30 210 660-3301, e-mail: kkarras@cres.gr

Nikola Rajaković
Faculty of Electrical Engineering, University of Belgrade
Bulevar kralja Aleksandra 73, 11120, Belgrade, Serbia & Montenegro
Phone:+381 11 3370168, FAX: +381 11 3248681, e-mail: rajakovic@etf.bg.ac.yu

Almir Ajanović
Intrade Energy, Zmaja od Bosne 44, 71000 Sarajevo, Bosnia and Herzegovina
Phone: +387 (33) 657 205, FAX: +387 (3) 365-7206, e-mail: almir.ajanovic@intrade.co.ba

Borut del Fabbro,
Istrabenz energetski sistemi, Tumova 5, 5000 Nova Gorica, Slovenia,
Phone: +386 1 33 11 974, FAX: +386 1 33 11 979, e-mail: borut.delfabbro@istrabenz.si

Eremia Mircea
Universitatea "Politehnica" Din Bucuresti,
Spl. Independentei, nr. 313, RO-060032 Bucharest 16, Romania
Phone: +40 (21) 4029446, FAX: +40 (21) 402-9446, e-mail: eremia1@yahoo.com

Suad Halilčević
University of Tuzla, Fakultet elektrotehnike,
Franjevacka 2, BH-75 000 Tuzla, Bosnia and Herzegovina
Phone: +387 (35) 300 526, FAX: +387 (35) 300 528, e-mail: suadh@untz.ba

Pavlos Georgilakis
ICCS / NTUA, School of Electrical and Computer Engineering, Division of Electric Power,
Iroon Polytechniou 9, GR-157 73 Athens, Greece
Phone: +30 (210) 7723661, FAX: +30 (210) 772-3659, e-mail: pgeorg@dpem.tuc.gr

Vlastimir Glamočanin
Faculty of Electrical Engineering, Ss. Cyril and Methodius University,
Karpos II bb, 1000 Skopje, Former Yugoslav Republic of Macedonia
Phone: +389 (230) 99 177, FAX: +389 (2) 306-4262 e-mail: vlasto@cerera.etf.ukim.edu.mk

Katja Keller
KEMA Consulting GmbH,
Kurt-Schumacher-Str. 8, 53113 Bonn, Germany
Phone: +49 (228) 44 690-00, FAX: +49 (228) 44690-99, e-mail: katja.keller@kema.com

Juan Rivier Abbad
ICAI, Universidad Pontificia Comillas,
Alberto Aguilera, 23, 28015 Madrid, Spain
Phone: +34 (91) 542 28 00, FAX: +34 (91) 542 31 76, e-mail: Juan.Rivier@iit.upco.es

Stane Merše
Jozef Stefan Institute,
Jamova 39, 1000 Ljubljana, Slovenia
Phone: +386 1 588 52 50, FAX: +386 1 561 2335, e-mail: stane.merse@ijs.si