LEGISLATION FRAMEWORK FOR CROATIAN RENEWABLE ENERGY SOURCES DEVELOPMENT

by

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The energy sector reform in the Republic of Croatia (started 2001), which comprises restructuring, liberalisation, privatisation, and changes in the overall energy sector, has a significant effect on the possibilities of introducing and increasing the share of renewable energy sources (RES). The adoption of a new legislative framework within the context of reforming Croatia's energy sector is of key importance for further development and for the future or RES utilization. The Electricity Market Act sets out the legal obligation to purchase electricity produced from RES in the manner that a quota or a minimum obligatory share of RES in electricity production is determined by a Government ordinance combined with Tariff system for the production of electricity from renewable energy sources and co-generation. Consequently, on the one hand, incentive funds needed to cover increased costs of production from RES will be collected from customers through the supplier and distributed to privileged producers (feed-in-tariffs, purchase is guaranteed to RES producers on known terms) through the Market Operator. On the other hand, RES investment projects will be encouraged by purpose-specific government subsidy and by the Environmental Protection and Energy Efficiency Fund (out of public budget).
By applying new energy legislation and associated by-laws (coming into force in 2007), RES projects in Croatia will be provided with a complete and stable legal framework as well as support through incentive measures which will equitably value environmental, social and other benefits of RES use.

Key words: *renewable energy sources, legislation framework, incentives, economic instruments*

Introduction

All European Union countries have committed themselves to changing the relations in the energy sector based on the common rules prescribed in the EU directives relating to the liberalisation of the electricity and gas markets. As part of its European integration process, Croatia has, through its legal and institutional framework, harmonised the overall concept of the energy sector reform with the EU requirements, within its specific national circumstances. The Directive on the promotion of electricity produced from renewable energy sources (RES) in the internal electricity market (2001/77/EC) lays

down the national indicative targets are consistent with the global indicative target of 12% of gross national energy consumption by 2010 and in particular with the 22,1% indicative share of electricity produced from RES in total Community electricity consumption by 2010 [1].

A precondition for the achievement of energy policy objectives, which are set in the Possible Directions of Croatian Energy Sector Reform [2], is the restructuring of state-owned energy companies and an expedited creation of organisational, economic, and legislative conditions for the privatisation which is to take place in the coming years. The Croatian Parliament, at its session held on July 19, 2001, adopted a new legislative framework which governs the relations in the energy sector: Energy Act [3], Electricity Market Act [4], Oil and Oil Products Market Act [5], Gas Market Act [6], and Energy Activities Regulation Act [7]. The Energy Act was amended and passed Parliament in end of 2004 [3]. In addition, the Energy Activities Regulation Act [7] and Electricity Market Act [4] are being substantially amended. A principal reason for amending the laws is to incorporate EU directives and instructions.

The role of the energy market is growing increasingly bigger since the energy industry is a key segment of an economy. Privatisation is a process that should enable market and competition to be formed, and the market should be both a measure and a mechanism of balance between the market relations and government intervention taking into account all relevant economic, technological, and social factors of energy use.

Use of RES and co-generation has a wide declarative support in strategic documents for the development of the energy sector and environmental protection in Croatia (Energy Development Strategy of the Republic of Croatia [8] and National Environment Protection Strategy [9]). Special status of RES and co-generation is also determined by Energy Act [3], which explicitly expresses the positive stand of the Republic of Croatia towards RES and co-generation. Article 14, paragraph 1 of the Act, explicitly says that the use of RES and co-generation is of interest to the Republic of Croatia.

It is precisely the strengthening of the private sector in Croatia, as far as it relates to the strengthening of the energy market that will have an important role in the implementation of energy efficiency and RES use programs. The energy sector reform will enable businesses and/or private initiative in the specific RES area to compete for construction of power production facilities (wind power plants, industrial power plants using biomass, biological waste treatment plants, small hydro power plants, solar power and heating plants, geothermal plants, *etc*.), fitting of installations, procurement of equipment and materials, manufacture of equipment and devices for the use of RES, and the like.

Energy policy and environmental policy decision-makers in Croatia have recognised the importance of economic instruments, primarily as means to prevent and reduce environmental pollution and use natural resources on a sustainable basis. Starting from their multiple advantages, these instruments are given an important place within the priority economic measures in the strategic and development documents (Energy Development Strategy of the Republic of Croatia [8], National Environmental Action Plan [9], *etc*.). The emphasis is placed on systematic development and gradual introduction of new economic instruments (pollution charge, deposit and refund system, *etc*.) while at the

same time changing the existing system of public revenues and expenses (taxes, customs duties, subsidies).

Objectives of Croatian energy policy and renewable energy policy

The Ministry of Economy, Labour and Entrepreneurship is in charge of the energy sector and as such responsible for formulating energy policy and strategy and drafting energy sector legislation.

The main objectives of the overall energy policy of Croatia are stated in the Energy Development Strategy [8], which was adopted by the Croatian Parliament in March 2002 for the period of 10 years. These objectives are:

– increased energy efficiency,
– security of energy supply,
– diversification of energy and sources,
– utilization of renewable energy sources,
– realistic and market-related energy prices and development of energy market and entrepreneurship, and
– environmental protection.

Thus, the use of RES is recognized by the Energy Development Strategy of the Republic of Croatia [8], as a constituent part of the energy policy. In view of Croatia's accession to the European Union and the gradual integration of Croatian energy systems into European energy markets, the importance of ensuring the implementation of the renewable energy *acquis* into Croatian legislation is recognized. Nevertheless, the necessary secondary legislation which should enable the development of this sector is still pending. The strategic objectives of the Government of Croatia relating to the energy sector are to achieve post-war reconstruction and to ensure security of energy supply through:

(1) efficient energy supply in the environmentally sustainable manner at realistic and socially acceptable prices,
(2) demonopolisation and liberalisation of energy markets,
(3) enabling competition in energy markets through privatisation where possible,
(4) establishment of a legal framework, and
(5) existence of measures in case the market is not functioning, and existence of institutions for the promotion of energy efficiency and RES and for the environmental protection.

About a half of Croatia's energy needs (fig. 1) are satisfied from domestic production (mainly oil and gas). However, production has been falling and energy imports will have to be significantly increased if the economic recovery is to be supported. Croatia will have to pay a full price in the international market for these imports, which may, coupled with significant investments in the reconstruction and expansion of energy infrastructure, present a considerable financial burden on the Government. This burden may be reduced if institutional and legal framework is created which will attract private

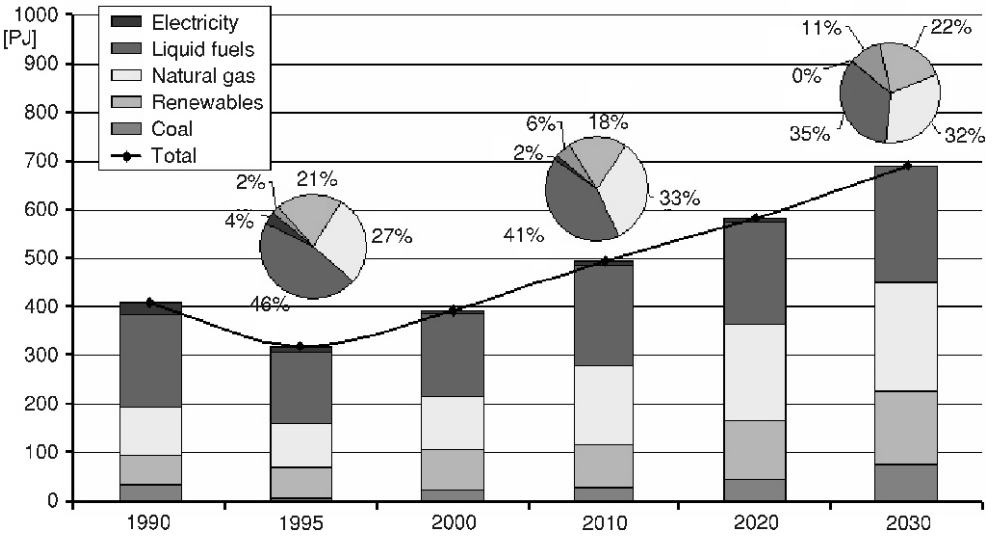

Figure 1. Total primary energy supply 1990-2030 [8]

finance in the sector. In addition, it will be necessary to use the scarce resources in a manner which ensures the greatest value for the Croatian economy.

The restructuring of the energy sector, including the electricity sector, has been carried out. National electricity company (Hrvatska Elektroprivreda – HEP), has been unbundled into separate generation, transmission and distribution companies.

Resolving of the problem of the financial support and/or compensation for RES incremental costs will enable the system and market operator (through the tariff system generally) to have distribution companies compensated for the difference between RES costs and other incremental costs (avoided costs of production, environmental externalities, *etc*.) and to pass this difference on to customers, or to compensate it by applying certain economic instruments.

In Croatia, an organised and systematic care for RES began on the basis of National Energy Programs, initiated in 1997 by the Government [10]. The programs that are especially important for RES are:

BIOEN – program for the use of energy from biomass and waste,
SUNEN – program for the use of solar energy,
ENWIND – program for the use of wind energy,
GEOEN – program for the use of geothermal energy, and
MAHE – program for construction of small hydro power plants.

The objectives and implementation strategy for any renewable source depend on the specific characteristics of a particular renewable source and/or on the use program. However, what is common for all of them is a significant increase in the share of renewable sources by 2030, which is in line with the general trend in EU countries.

Overview of renewable energy sources in Croatian energy balances

In the future, a gradual reduction in the production of fossil fuels and an increase in energy generation from RES are expected. Renewables should play an increasingly important role in the energy supply.

In 2005, the total primary energy supply decreased by 3.5 per cent with respect to the previous year. The greatest fall was recorded in hydro power harnessing because 2005 was hydrologically a less favourable year than the previous one, so that in 2005 the energy production from hydro power was lesser by 9.6 per cent. The crude-oil production noted a decrease by 5.5 per cent, and the energy production from fuel wood was lesser by 6.9 per cent. Total primary energy production is shown in fig. 2.

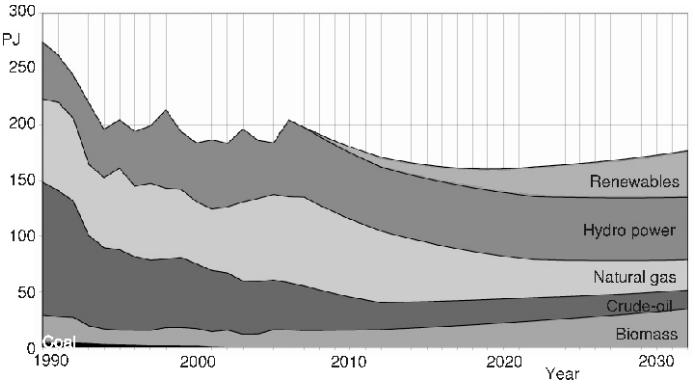

Figure 2. Primary energy production [11]

The harnessing of RES (wind energy and landfill gas) showed a significant increase expressed in percentages, but the total amount of energy in question is minute. Installed capacities for heat and electricity generation from RES in Croatia for 2005 are given in tab. 1.

Table 1. Installed capacities for heat and electricity generation from RES in Croatia for 2005 [11]

Type of renewable energy source	Installed heat capacity	Installed power capacity
Solar	n. a.	48.84 kW
Wind	0	5.95 MW
Biomass	512 MW	2 MW
Small hydro	0	26.7 MW
Geothermal energy	113.9 MW	0
TOTAL	625.9 MW	34.698 MW

Currently there are no reliable data which would enable a determination of the installed heat capacities of solar collectors; therefore, this data is not included in the tab. 1. The data on the heat capacity of heating plants using biomass refer to biomass-fired industrial facilities and do not contain information on heat capacity of small heating furnaces and on hot water preparation in households. Total installed capacities of geothermal sources in 18 locations in use in Croatia amount to 36.66 MW_t when space heating is concerned, and 113.9 MW_t when geothermal energy for space heating and hot water preparation is concerned.Table 2 shows the electricity generation and tab. 3 the heat generation in Croatia for 2005.

Table 2. Electricity generation from RES in Croatia for 2005 [11]

Type of renewable energy source	Electricity generation
Solar	50.14 MWh
Wind	9.5 GWh
Biomass	10.9 GWh
Small hydro	108.3 GWh
Geothermal energy	0

Table 3. Heat generation from RES in Croatia for 2005 [11]

Type of renewable energy source	Heat production
Solar	n. a.
Wind	0
Biomass	14.767 TJ
Small hydro	0
Geothermal energy	547.33 TJ

Currently there are no reliable data which would enable a determination of the installed heat capacities of solar collectors; therefore, this data is not included in the table. Heat generation from biomass, including the generation in industrial heating facilities and heat generation from fuel wood for heating and hot water preparation in households, is in total 14.767 TJ. Heat generation from geothermal sources in 2005 amounts 124.01 TJ for space heating only and 547.33 TJ for space heating and hot water preparation.

Renewable energy sources in the energy sector reform and new legislation

Primary legislation

As far as practical use of RES and co-generation in Croatia is concerned, currently tens of projects for the construction of wind power plants are in preparation, several projects for biomass and biofuel use, market for solar collectors and cells, even though currently undeveloped, is expanding rapidly, and several small hydro power plant projects are also in preparation. There are also a certain number of constructed industrial co-generation plants and public heating plants that use co-generation processes, and many more industrial and small co-generations can be expected considering a large number of preliminary designs and initiatives. All of these projects, apart from few individual

applications of RES and co-generation as well as few projects being implemented outside an organised system founded on the existing legislative solutions, and based on the permissions and consents given prior to the adoption of energy laws, are currently waiting for the adoption of rules of application and management of an incentive system determined by the Energy Act [3] and Electricity Market Act [4].

Taking into consideration the obligation to adopt by-law regulations from RES and co-generation areas, which is the main prerequisite for their systematic and organised development, as well as significant yet to be used potential of RES and co-generation, a fast and total adoption of legal framework is necessary as well as the regulation of trading conditions for such projects. Sub-regulated environment for RES like the one that exists in Croatia is not in accordance with the accepted European policy or the development degree of national legislatives in the area regarding the use of RES and co-generation. With the adoption of by-law regulations that regulate this area it is necessary to overcome this setback.

Therefore, acts being adopted are:

(1) Acts coming from the Energy Act [3]
- Ordinance on the use of renewable energy sources and co-generation (Article 4 paragraph 2),
- Tariff system for the production of electricity from renewable energy sources and co-generation (Article 28 paragraph 3), and
- Regulation on the fee for the promotion of the electricity production from renewable energy sources and co-generation (Article 28, paragraph 3);

(2) Acts that come from the Electricity Market Act [3]
- Regulation on the minimum share of electricity produced from renewable energy sources and co-generation in the electricity supply (Article 26, paragraph 4), and
- Ordinance on the obtaining of the status of privileged producer (Article 8, paragraph 2).

Opening of the energy market to the RES and co-generation is closely connected to the opening of the energy market and the implementation of an authorisation system for the construction of new producers as a whole. With the aim of ensuring conditions for an enterprise initiative based on recognised business interest, construction of new plants is left to the market and to the decisions of individual members, and that it is necessary to construct a system of objective, clear, unbiased and beforehand publicly announced criteria, and a system of constituent authorisations for energy subjects that want to produce energy. Project identification, construction preparation and the realisation of plants using RES and co-generation should therefore be a free choice of the energy subject that satisfies the prescribed criteria as also determined by the Electricity Market Act, in Article 9, paragraph 1 [4].

Construction of buildings for the production of electricity is possible only based on the authorisation issued by the Ministry responsible for energy (Electricity Market Act, Article 9, paragraph 4), while the issuance procedure for the mentioned authorisation is based on the principles of objectivity, clearness, and impartiality (Article 9, paragraph 2). RES and co-generation in the structure of electricity consumption is given in fig. 3.

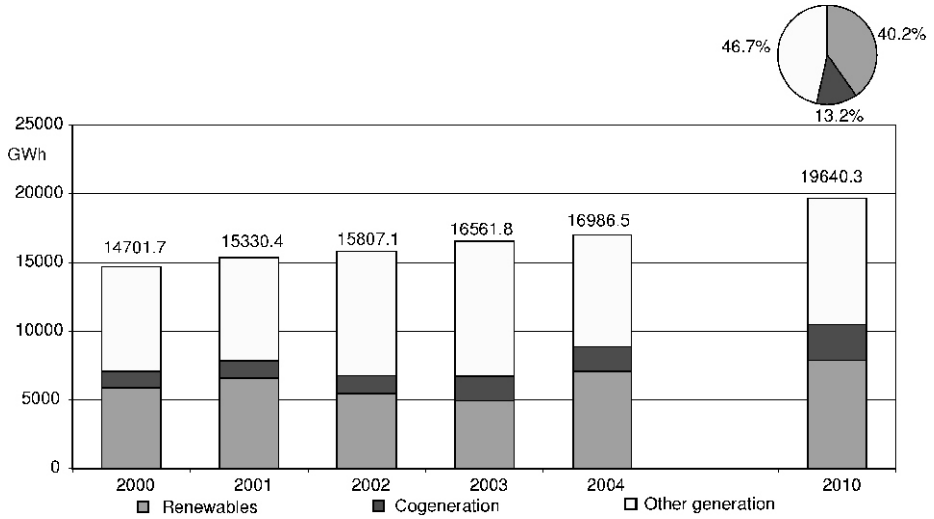

Figure 3. Renewable energy sources (including large hydroelectric power plants over 10 MW) and co-generation in the structure of electricity consumption in Croatia

Secondary legislation

Tariff system for the production of electricity from renewable energy sources and co-generation

This tariff system has been prescribed by and is under direct control of the Government of the Republic of Croatia, in accordance with provisions of the Energy Act, estimates the definition of incentive prices for the electricity produced from RES and co-generation. This tariff system contains guaranteed incentive prices for the production of electricity from all plants using RES or co-generation and that have the right to an incentive. However, since privileged producers have the right to place their total production of electricity into the network, it is necessary to define the price at which that electricity will be purchased [12]. In the case of RES and co-generation, plants that will deliver electricity in the scope and up to the level of minimum share prescribed by the Provision on minimum share of electric energy produced from RES and co-generation, will have the right to an incentive or promotional price.

System of guaranteed rates does not reflect current relation of electricity supply and demand but the competitiveness happens between energy subjects in identification and implementation of projects for use of renewable energy sources and co-generation. Since the system of guaranteed rates is not connected to an individual Purchase contract, instead it is defined by law; risks connected to this system, looking at the investor's point of view are greatly acceptable.

Other incentive forms, ones on the side of investment cost decrease, are more acceptable to the heat producers using RES as well as to public plants using renewable sources, since their incentives mechanisms are primarily provided from the Environment Protection and Energy Efficiency Fund [13].

Regulation on the fee for the promotion of the electricity production from renewable energy sources and co-generation

It is planned that the promotion system of RES and co-generation for the production of electricity will be included in the Tariff system for the production of electricity from RES and co-generation and the Regulation on the fee for the promotion of electricity production from RES and co-generation, based on the funds collected from the fee for the promotion of RES and co-generation contained in the price of electricity, in the manner it is laid down in the Energy Act, Article 25, and not from the budget [14].

Regulation on the fee for stimulating electricity production from RES and co-generation, determines the charge rate for the stimulation of RES that every energy supply subject (both tariff and privileged buyers) will have to include in the price of energy, with the aim of collecting funds for the payment of incremental expenses deriving from the promotion of RES and co-generation.

For selected scenario RES2 (medium) share of RES is determined to the level of avoided electricity production expenses in power plants using fossil fuels increased by local external expenses assumes the level of around 1139 GWh per year of renewable resources which represents a share of around 5.8% in the designed total consumption of electricity by 2010.

According to this scenario, as with the prior one (starting year is the same for all three scenarios), to cover the incremental expenses of production from RES in the first year (2007) it is necessary to raise 112.6 millions kuna (1€ = ~7.3 kuna), while at the end of the monitored period 398.5 millions kuna need to be raised. Converted onto the incentive fee expressed in kWh it represents a fee increase from 0.0081 kuna/kWh in 2007 to 0.0262 in 2010. Even though all three scenarios are economically justifiable for Croatia, implementation of Scenario RES2 is suggested as the most acceptable one. Scenarios are given in figs. 4 and 5.

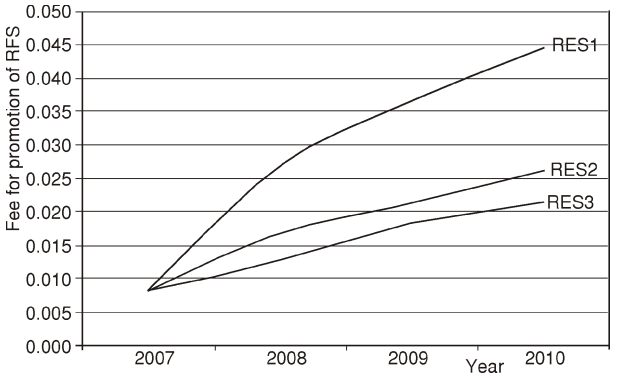

Figure 4. Movement of incentive fee up till 2010 for all three assumed scenarios

All calculations are performed based on the height of promotional prices suggested

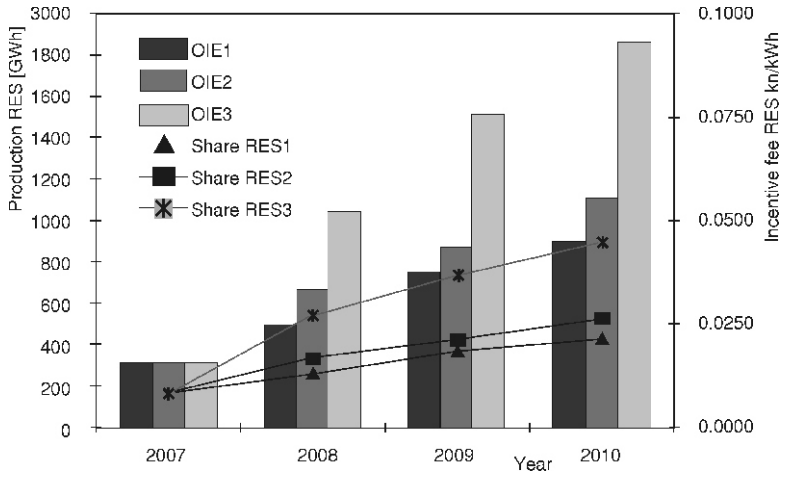

Figure 5. Movement of RES shares up till 2010 for all three assumed scenarios

by the Tariff system for the production of electricity from RES and co-generation, where in the calculation of needed funds for the promotion of RES and co-generation and the fee height predictable market electricity price of 0,2625 kuna/kWh is assumed. This price is deducted from the feed in tariff because it does not represent an incremental expense covered from the allowance for the promotion of renewable sources and co-generation.

Regulation on the minimum share of electricity produced from renewable energy sources and co-generation in the electricity supply

Taking into account the economic situation, as well as the potential of RES in Croatia, draft Regulation on minimal share of electricity produced from RES and co-generation in the electricity supply determines that in 2010 the minimum share of RES in customer supply will amount to 1139 GWh per year of electricity without electricity from large hydro power plants [15].

Such a production level is economically justifiable for Croatia from the point of view of avoiding local damages to the environment. Production of 1139 GWh in 2010 will represent about 5.8% in the structure of total electricity consumption in relation to the share of 0.8% in Croatia in 2004. The methodology developed within the World Bank project – Renewable Energy Resources Project was used for calculations, and which is described in detail in the Cost-Benefit Analyses of Renewable Energy in Croatia study drawn up in cooperation with Frontier economics consultants [16]. The results of the study were discussed and agreed to a great extent with interested parties.

This Regulation will also contain the monitoring of the minimal share of RES and co-generation fulfilment, which will be implemented by the Government of the Republic of Croatia and the Croatian Energy Regulatory Agency through regular annual reports on the realised share of electricity produced from RES and co-generation in the previous year submitted by the Market Operator. In the case that the realisation does not follow targets, the Government will be in the position to undertake additional measures.

Ordinance on the use of RES and co-generation

According to Article 14 of the Energy Act [3], the Ordinance determines the "renewable energy sources used for the production of electricity, conditions and possibility of their use, including planning, registry of renewable energy source and co-generation projects and other questions important to the use of RES and co-generation", as in the declaration by which it is stipulated in the Energy Act it enables absolute treatment of the RES and co-generation use problem, and by which a predictable, implemental, and rounded framework will be created for the planning and realisation of RES and co-generation projects. These Ordinance therefore define groups of plants that use RES and co-generation, prescribe general and specific conditions, criteria and methods of authorisation for plants using RES and co-generation, introduce project registry, define general provisions relevant to the connection of plants using RES and co-generation onto the power networks and provisions regarding access to there objects [17].

Adoption and implementation of approval systems for the construction of buildings for the production of electricity do not prejudice the number of authorisations that need to be collected for each individual plant. Authorisation system issued by the ministry in charge of energy is elaborated in great detail and customized to the nature of individual RES and co-generation through prescription of special conditions and criteria that individual plants have to fulfil. Authorisation system is divided into a preliminary and final authorisation with the intention of ensuring design monitoring by the body performing the authorisation and registration, and on the other hand to ensure investment security for the projects that by its planning and construction logic include a long phase of potential examination and/or collection of necessary licenses and consents. It is expected from this kind of authorisation system to make RES and co-generation projects acceptable for financing or to improve and facilitate possibilities and conditions of their financing by financial institutions. All rights obtained by preliminary and final authorisation for construction have a limited duration period which reduces the possibility for speculator behaviour of participants through project „reservations" or obtaining of certain rights without a real will for investing in RES and co-generation projects which in the end inhibits development and increases the cost of RES and co-generation use in Croatia.

Republic of Croatia is determined to produce a certain part of its energy from RES and co-generation, and in that direction and in accordance with the Directive 2001/77/EC [1], a minimum share of RES and co-generation in the electricity supply of customers will be prescribed. In that regard it will be necessary to prove that share in an unambiguous manner, therefore with this Ordinance a registry system of planned and realised projects (manufacturers) for electricity from RES and co-generation is intro-

duced along with the registry of privileged producers. Apart from that, suggested system of RES and co-generation enticement through fees and rate systems for stimulation of RES and co-generation demands continuous monitoring of certain parameters with the aim of development and planning anticipation of the total amount of funds needed for incentives.

Because of the above stated reasons, according to the Ordinance draft on the use of RES and co-generation, Ministry in charge of energy, based on the defined criteria, the construction of objects that use RES and co-generation for the production of electricity, while the Ministry of Economy, Labour and Entrepreneurship and Market Operator keeps a singular registry of projects and plants using RES. The aim of this registry is design monitoring of renewable energy source's development, supervision and implementation of an authorisation system for plants using RES and monitoring and effective management of incentive assets.

Ordinance on the obtaining of the status of privileged electricity producer

The Ordinance prescribes the types of plants according to the implementation of specific technologies using RES for the production of electricity, which can obtain the privileged producer status. Prescribed types of plants meet, or set the basic criteria in accordance with the expert evaluation of the market conditions, technology development and the situation on the field in the Republic of Croatia, and in accordance with the relevant European directives. Considering specific technical qualities of implementation and social justification, plants that can obtain the privileged electricity producer status can be divided into two basic groups: plants with the installed power lower or equal to 1 MW connected onto the power distribution network and plants with the installed power of over 1 MW connected to the transmission of distribution power network [18].

It is considered that hydro power plants with the power of over 10 MW cannot obtain the status of a privileged producer since these plants, because of their size and total installed capacity can cause considerable disturbances in market relations if their production becomes privileged. In fact, because of their production characteristics, operation possibility implying expected overflows caused by the characteristics of hydrology, almost complete independence in regards to the suppliers (of *i. e.* energy generating products) and especially real plant expenses, these plants are entirely competitive on the electricity market. Therefore there is no need for the protection of their production through the obtaining of privileged status within this Ordinance, or obligations to take over the complete production of electricity since these same plants come to a high place in the system when new power plants are engaged both by their price and production characteristics. This insures realistic relations and healthy competitive forces on the market and it entices the development of the national electricity market.

As with the plants using RES, types of co-generation plants that can obtain privileged status are also prescribed considering their use of specific co-generation processes or examining techno-economical specifics of implementation [19] and the economic justification in terms of ecological contributions and contributions on the market,

cogeneration plants that can obtain privileged electricity producer status are divided into two basic groups: plants with the installed power lower or equal to 1 MW connected onto the power distribution network and plants with the installed power of over 1 MW connected to the power transmission or distribution network.

Connection to the network is an important prerequisite for the plants to even consider being nominated for the privileged producer status because obtaining of this status for plants that are not connected to the network is impossible. Those plants are outside the market with the fact itself that they cannot sell electricity to the customers on the market. Also, the Electricity Market Act in its Article 3, paragraph 2 [4] determines the market values but it does not prescribe that any subject producing for its own needs, in an island plant or similar, is indeed a part of the market, or relevant subject in terms of this Act.

Role of Market Operator

The Market Operator, in compliance with the Electricity Market Act, Article 30, is responsible for:

- entering into contracts with all suppliers for the purpose of ensuring a minimum share of electricity produced from RES and co-generation,
- collecting fees for incentivizing RES sources and co-generation from suppliers of the tariff and eligible customers,
- entering into contracts with privileged electricity producers entitled to incentive price, and
- calculation, collection, and allocation of funds from the fee for incentivizing RES and co-generation to producers of electricity from RES and co-generation based on the contracts entered into.

Within the scope of RES and co-generation use (connected to the electric power network), an important role in the organisation of energy purchase, regulation and implementation of contracted financial obligations, as well as in the collection and division of incentives for the use of RES and co-generation is designed for the market operator.

With the proposed implementation organisation, mentioned legislation provisions come to life in their entirety through an easily implemented and easily manageable system used to collect incentive funds for the settlement of increased production expenses from individual RES and co-generation from all buyers (tariff and privileged), through energy supply subjects and market operator distributed to the producers using RES. Consumption of the right to an incentive is possible only after the completion of an authorisation process for the plant using RES, while the right to an incentive is lost with the loss of a privileged producer status. The role of Market Operator is shown in fig. 6.

Procedures and methods of collection and division of funds for the settlement of incentives as well as calculation and payment procedures are organised with the suggestions of the draft Tariff system for the production of electricity from RES and co-generation and the draft Regulation on the fee for stimulating electricity production from RES and co-generation.

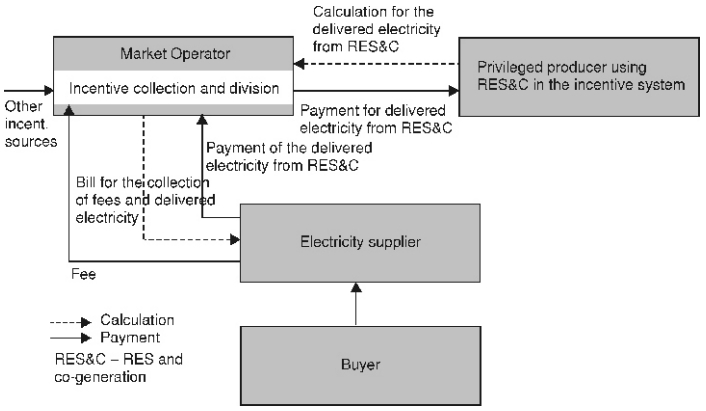

Figure 6. Incentives' system scheme

Other economic instruments

RES projects will be encouraged by purpose-specific government subsidy for manufacturers and by the Environmental Protection and Energy Efficiency Fund (out of public budget) for RES investment projects. RES use by direct customers will depend on whether the interest chain in which the end user participates is completely closed. RES projects in electricity and heat production will be financed on an entrepreneurial basis, assuming of course the above mentioned incentive measures for RES use are in place. For these projects, it is important that the financing of preparatory and promotional activities comes from the state and local community. This means that it is necessary to achieve market prices of other sources of energy, reduce prices of equipment and devices by incentive measures and offer loans on more favourable terms.

It is known that some measures relating to increase in energy efficiency and to the use of different RES forms (use of solar energy for the domestic hot water, use of biomass and wind for electricity production, *etc*.) pay back fast and create positive effects on creating of new jobs (resolving the unemployment problem), increasing revenues in agriculture and forestry, and developing rural areas as well as the overall economy in Croatia. But these measures also require incentive funds, so that it will be necessary to apply the above mentioned policy instruments and incentive measures, primarily financial resources of a special fund.

Concluding considerations

The changes planned to be made in the markets for interconnected energy systems in Croatia, which include restructuring, privatisation, and changes in the overall energy sector, will have a significant effect on the possibilities of introducing and increasing the use of RES.

When new energy legislation and by-laws come into force in the 2007 and are fully applied, the RES projects in Croatia will be provided with a complete and stable legal framework and support through incentive measures which will equitably value environmental and other benefits of the renewables. Following the trends in other European countries, Croatia will thus set a transparent platform for the expected growth of the RES sector.

It has been proved beyond doubt that Croatia has good potentials for RES, and significant basic sources, including relatively good resources in all technologies, and excellent resources in some of them. For some years now numerous companies have been working on the development of projects anticipating considerable investments in utilization of RES. Applying the experience of successfully completed projects and facilities constructed in Europe and the world, potential investors and various companies and institutions are making every effort and investing considerable funds in an area which is indeed new for Croatia, but will certainly represent an important segment of the energy sector in the near future. Also, foreign consultants have assessed that Croatia has highly skilled human resources. This is important for the implementation of projects and for the expected future growth and a wider social role of RES.

The introduction of adequate economic instruments aimed at increasing the RES share in the energy system and in the environmental improvement system in Croatia will produce effects at the macroeconomic level too. The number and volume of investments will gradually increase and these will not only help the growth of investments into RES and the environmental protection but in sustainable development as well.

References

[1] ***, Directive 2001/77/EC of European Parliament and of the Council on the promotion of electricity produced from renewable energy sources in the internal electricity market, OJ, L283, September 27, 2003
[2] ***, Committee for Energy Sector Reform, Possible Directions of Croatian Energy Sector Reform (in Croatian), Ministry of Economy, Zagreb, 2000
[3] ***, Energy Act (in Croatian), Official Gazette 68/2001 and Act on Amendments to the Energy Act, Official Gazette 177/2004
[4] ***, Electricity Market Act (in Croatian), Official Gazette 68/2001 and 177/2004
[5] ***, Oil and Oil Products Market Act (in Croatian), Official Gazette 57/2006
[6] ***, Gas Market Act (in Croatian), Official Gazette 68/2001
[7] ***, Energy Activities Regulation Act (in Croatian), Official Gazette 68/2001 and 177/2004
[8] ***, Energy Development Strategy of the Republic of Croatia (in Croatian), Official Gazette 38/2002
[9] ***, National environment protection strategy (in Croatian), Official gazette 46/02
[10] Granić, G., and co., National Energy Programs, Introduction Book, Ministry of Economy, Energy Institute Hrvoje Požar, Zagreb, 1998
[11] ***, Annual Energy Report Energy in Croatia, Ministry of Economy, Labour and Entrepreneurship, Zagreb, 2006
[12] ***, Draft of Tariff System for the Production of Electricity from Renewable Energy Sources and Co-Generation, Ministry of Economy, Labour and Entrepreneurship, Zagreb, 2006

[13] Raguzin, I., Founding of Environmental Protection and Energy Efficiency Fund (special edition), Privredni vjesnik, Zagreb, 2003
[14] ***, Draft of Regulation on the fee for the Promotion of the Electricity Production from Renewable Energy Sources and Co-Generation, Ministry of Economy, Labour and Entrepreneurship, Zagreb, 2006
[15] ***, Draft of Regulation on a Minimum Share of Electricity Produced from Renewable Energy Sources and Co-Generation whose Production is Encouraged, Ministry of Economy, Labour and Entrepreneurship, Zagreb, 2006
[16] ***, Frontier Economics, Cost Benefit Analysis for Renewable Energy in Croatia, Report prepared for HBOR, Ministry of Economy and World Bank/GEF, London, 2003
[17] ***, Draft of Ordinance on the Use of Renewable Energy Sources and Co-Generation, Ministry of Economy, Labour and Entrepreneurship, Zagreb, 2006
[18] ***, Draft of Ordinance on the Obtaining of the Status of Privileged Electricity Producer, Ministry of Economy, Labour and Entrepreneurship, Zagreb, 2006
[19] ***, Council Directive 2004/8/EC on the Promotion of Co-Generation Based on Useful Heat Demand in the Internal Energy Market and Amending Directive 92/94/EEC, OJ, L 52/50, 2004

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