MANAGING CROATIAN ENERGY LEGISLATION WITH EUROPEAN UNION ENERGY PACKAGE

Since Croatia started acquiring the status of a candidate for European Union (EU) membership it has been adjusting its legislation with EU requirements. Moreover, Croatian electricity sector is facing a numerous challenges and significant changes in legislation are needed in order to successfully complete the process of market liberalization. The biggest challenge in Croatian electricity sector is to achieve a 20% share of renewable energy sources (RES) in gross final energy consumption by the year 2020. Croatia currently has about 15.1% of RES in gross final energy consumption and one of the ways to achieve its goal is to increase production capacity from renewable energy sources in accordance with energy consumption. Furthermore, the opportunities for establishing economic growth through innovation and a sustainable competitive energy policy have been very well recognized in Croatia. Therefore, the overall investments in energy production from renewable sources will have significant impact on growth and employment in rural parts of country which is in line with EU RES strategy.

Key words: managing, energy strategy, renewable energy resources

1. Introduction

Croatia, as a member of the European Union (EU), is committed to align its energy sector with EU objectives, and to adopt its goals with EU Directive 2009/28/EC on the promotion of the use of energy from renewable sources. The Directive requires EU member states to produce a pre-agreed proportion of energy consumption from renewable energy sources (RES) such that the EU as a whole shall obtain at least 20% of total energy consumption from RES by the year 2020. Moreover, it reinforces the 20-20-20 agenda of the EU, e.g. 20% reduction in greenhouse gas (GHG) emissions, 20% share of renewable energy in gross final

* Barbara Dorić, Msc, Croatian Hydrocarbon Agency, Zagreb, Croatia, e-mail: barbara.doric@cei.hr

** Dinko Primorac, PhD, Assistant professor, Faculty of Economics, Croatia, e-mail: primoracdinko@gmail.com

*** Ana Jovancai, PhD, Assistant professor, Megatrend University, Serbia, e-mail: ajovancai@megatrend.edu.rs

consumption, and 20% reduction in energy consumption and 10% share of renewable energy in transport.

Considering EU objectives and large investment potential in developing energy markets RES is in the special focus of almost every government. Therefore, most of the EU governments are trying to implement different actions in order to reach EU goals. However, if we analyze Croatian share of RES, in gross final consumption in the year 2012, we can see it is around 15.1% (Figure 1). For that reason, Croatian plan is that remaining 4.9% of the 20% target share shall be produced from newly constructed renewable energy plants that Croatian government is supporting.

Figure 1: Share of RES in gross final energy consumption in Croatia
(<http://epp.eurostat.ec.europa.eu>)

2. Croatian energy strategy and implementation challenges

Croatia nowadays imports nearly 30% of electricity and 75% of primary energy, and it is highly dependent on energy imports which, in the case of growth of energy prices on the international market, have far-reaching consequences for the competitiveness of the Croatian economy. Therefore, Croatian Energy Strategy (CES) was adopted by the Croatian Parliament in 2009¹ setting the goal of building at least 2400 MW of new thermal power plants, 300 MW of large hydro, and 1655 MW from renewable sources by the year 2020. Furthermore, after adoption of CES in the year 2009, Croatian government adopted one more strategic plan and set the goals in renewable energy sources plan (RES) of electricity production (Table 1). CES wants to retain at least a 35% share of RES, which includes large hydro power plants (excluding pumped storages) by the year 2020, with the ultimate target of reaching at least a 20% share of RES in gross final consumption. We see that hydro power plants accounts almost 30% of the RES electricity balance, but we need to consider that even hydro energy costs are low, the down side of hydro energy production is consequently large dependence on hydrological conditions.

¹ Croatian Energy Strategy (CES), source: <http://narodne-novine.nn.hr>

Table 1: Plan of electricity production from renewable energy sources by the year 2020. (<http://www.mingo.hr>)

Renewable energy sources	Megawatts
Wind power plants	1200
Solar power plants	45
Small hydro power plants	100
Biomass	140
Biogas	110
Municipal waste	40
Geothermal power plants	20

From Table 1 it is clearly seen that Croatian government based its development strategy of RES mostly on wind plants (72.5%). However, this energy strategy is based on the assumption of gross final energy consumption with annual growth of 2.7%, which is not in accordance with the current decline in consumption of 1.3% per annum, whereas gross final energy consumption in the year 2011 reduced by 2.5% compared to the year 2010 (Figure 2). Moreover, in the period from 2006 to 2011 a final energy consumption reduction trend was observed at an average annual rate of 1.3%. Therefore, as it is not likely that the predicted consumption growth will occur, and the given estimations should be revised.

Figure 2: Trends in Croatian final energy consumption (http://www.eihp.hr/hrvatski/projekti/EUH_od_45/EUH11web.pdf)

Revising predictions on consumption growth has a direct impact on the goals of RES which also impacts installed capacity targets by the year 2020, and construction of an incentive system to support implementation of new RES.

3. Analysis of Croatian current situation

Now days, three year after Croatian Energy Strategy was adopted, we can see that it has very low implementation rate regarding renewable energy sources projects. Progress of newly constructed RES projects towards targets set in the Energy Strategy is only 13.8% (Figure 3). Poor implementation of RES projects is a consequence of legal, technical and financial barriers, as well as lack of cooperation between institutions which all contributed to making the administrative procedure for RES to become lengthy, with inherent uncertainties and risk for prospective investors. Also, due to specifics of the Croatian electricity grid it is questionable whether the strategy goals are realistic.

Figure 3: RES projects in March 2013 (MW) that are connected to the grid by types in relation to the objectives defined by the Croatian Energy Strategy (<http://oie-aplikacije.mingo.hr/pregledi/>)

3.1. Wind power plants

Croatia has a high potential for the realization of wind power. However, due to the lack of secondary regulation power in the system the capacity is limited to 400 MW, which will be achieved by the year 2015. In the Registry of renewable energy projects and cogeneration (OIEKPP Registry)² there are 4,267 MW of registered projects in various stages of implementation. The current technical potential of the transmission system enables connection of 400 MW without loss of system stability. For this purpose a quota system was established for wind energy projects.

² OIEKPP Registry, source: <http://solarserdar.wordpress.com>

Figure 4: Overview of wind power projects in progress March 2013 (MW)
(<http://oie-aplikacije.mingo.hr/preglediand> <http://www.hep.hr>)

The quota of 400 MW consists of 205,3 MW of wind power plants already in operation and 202,7 MW for which implementation (commissioning) is planned in 2014, and they are all within the quota (Figure 4). Solutions for expansion of secondary regulation capacity in the network are currently being developed to ensure the successful implementation of new wind power plants, but timeframe for expansion is not yet known.

3.2. Solar power plants

There are 4,7 MW of solar power plants (photovoltaic) operational in Croatia and in the near future connection of additional 31,7 MW is expected. In the OIEKPP Registry there are 340 registered projects with a total installed capacity of 86,7 MW in various stages of implementation. There are no technical limitations to the growth of the number of connections to the network. Currently the only limitation on solar power plants is the annual quota that is defined by the Croatian energy market operator (HROTE)³, formed due to limitations in the resources available for the payment of incentives. From the year 2007 to 2012 quota for integrated solar power plants was 1 MW while 7 MW was contracted. For the year 2012 quotas for integrated solar systems (installed on buildings) were 10 MW and 5 MW for non-integrated. For the year 2013 quota for integrated solar systems is set at 15 MW and 10 MW for non-integrated. All quotas for integrated systems have been filled. However, since there are only 4,7 MW of projects currently in operation, it is necessary to change the way of calculating fulfilment of quotas (currently it is calculated as projects that have signed a contract with HROTE, and it should be calculated as project that already started operation).

³ HROTE, source: <http://www.hrote.hr>

Furthermore, given the small annual energy production and the benefits of distributed generation, there are no obstacles to a large increase of targets.

Figure 5: Overview of solar power plants projects in progress March 2013 (MW)
(<http://oie-aplikacije.mingo.hr/pregledi> and <http://www.hrote.hr>)

3.3. Small hydro power plants (SHPP)

There are currently 1.3 MW of SHPP operational in Croatia, while additional 0.3 MW is under construction. However, a number of key permits for project initiation “the previous energy approvals” have expired. Currently there are only 3 ‘previous energy approvals’ which are still valid, along with 5 ‘energy approvals’ (a permit for plant construction in advanced implementation stages, subsequent to location permit), for a total capacity of 5.4 MW. OIEKPP Registry has 63 registered projects with a total installed capacity of 128.8 MW in various stages of implementation, but expected realization is low although there are no technical limitations for connection to the grid.

Figure 6: Overview of small hydro power plants projects in progress March 2013 (MW)
(<http://oie-aplikacije.mingo.hr/pregledi> and <http://www.hrote.hr>)

Part of the areas viable for construction of SHPP is covered by the Natura 2000 network⁴ which complicates construction. In Croatia there is very small interest for small hydropower plants and the implementation of projects is poor due to the risk and long administrative procedures. Furthermore, due to a small number of remaining locations with unrealized hydro potential, it is unlikely that there will be more than 100 MW of SHPP implemented in total.

3.4. Biomass power plants

Currently there are 6,7 MW of biomass plants operational in Croatia, while 46 MW are at an advanced stage of implementation, e.g. have signed contracts for procurement of raw material from Croatian Forestry. A consolidated list of projects from OIEKPP Registry and Ministry of Economy reports contains 102 projects with a total installed capacity of 256,82MW and its needed to say that there are no technical limitations for connection to the grid. According to the issued energy approvals, a realization of 77,5% of the target set in the Energy Strategy can be expected by 2015. Furthermore, given the maturity of the technology a large investor interest is expected. There are also synergies possible with the wood industry for simultaneous generation of electricity and heat from RES. The target goal for biomass plants should be increased.

Figure 7: Overview of biomass hydro power plants projects in progress March 2013 (MW)
(<http://oie-aplikacije.mingo.hr/pregledi> and <http://www.hrote.hr>)

⁴ Natura 2000 network, source: <http://ec.europa.eu/environment/nature/natura2000>

3.5. Biogas power plant

There are currently 8 plants operational in Croatia with a total capacity of 8,1 MW while 4 plants with total capacity of 7,5 MW are in the stage of construction. In OIEKPP Registry there are 51 registered projects with a total installed capacity of 77,91 MW in various stages of implementation. There are no technical limitations for connection to the grid for this kind of plants but there's potential depends on the ability of simultaneous delivery of electricity and heat to nearby consumers. Due to high investment costs of biogas plants in the current market, biogas projects are less attractive to investors compared to other sources. So far, investors' interest is not satisfactory to realize target of 110 MW set in the CES.

Figure 8: Overview of biogas power plants projects in progress March 2013 (MW)
(<http://oie-aplikacije.mingo.hr/pregledi> and <http://www.hrote.hr>)

4. Conclusion

After the study of Croatian Energy Strategy and after analyzing renewable resources power plant implementation we can conclude that certain changes are needed to be implemented in this strategy immediately. In order to achieve the target share of RES in gross final consumption, according to EU obligations, goals of the Croatian Energy Strategy should be revised.

In the time when the Croatian Energy Strategy was made the government has not thought that world economy crisis will effects economy in so big scale. Moreover, projections for the year 2020 were based on stable growth of the economy while the reality was a huge recession in the world. In-depth analysis of barriers in the administrative procedure for the implementation of RES projects should be made. Also, the dynamics of RES projects implementation is not sat-

isfactory. The government should be aware that presumption of grid development to accept the 1200 MW wind power has not been yet achieved. Also, the plants for the production of renewable heat, which are also included the target of 20% RES in EU, do not represent a significant burden on the grid and are not adequately addressed in energy policy. Moreover, the energy production from solar power plants is much cheaper now due to technological progress and is nowadays suitable for mass implementation.

We often witness that investors display huge interest for renewable power plants, while the strategy makers do not prepare the country's strategy plan well; do not consider maturity of the technologies and the time required for project implementation in the design of the system. The construction of new power plants is essential for Croatia due to high dependence on imports and hydrological conditions, which can vary significantly in the short-term and mid-term. In the long-term RES is the optimal choice for new capacities since it does not depend on fuel costs or disturbances in foreign markets. The strategy has to set development principles according to which Croatia will become an exporter of energy, and its energy sector will become more profitable. At the time finishing this article a new indication is seen that the Croatian government will make new, critical step which will be in focus of achieving Croatian energy independence.

Literature

- *EU Directive 2009/28/EC*. Retrieved 03.07.2013 from <http://eur-lex.europa.eu>.
- *Croatian Energy Strategy*. Retrieved 03.07.2013 from <http://www.mingo.hr>.
- *Energy Institute Hrvoje Požar*. Retrieved 03.07.2013 from <http://www.eihp.hr>.
- *Croatian centre of renewable energy sources*. Retrieved 03.07.2013 from *Ministry of Economy*. Retrieved 03.07.2013 from <http://oie-aplikacije.mingo.hr/pregledi>.
- *Croatian transmission system operator*. Retrieved 03.07.2013 from <http://www.hep.hr>.
- *Croatian energy market operator*. Retrieved 03.07.2013 from <http://www.hrote.hr>.

Barbara Dorić, doktorand

Hrvatska agencija za ugljikovodike, Zagreb, Hrvatska

Doc. dr Dinko Primorac,

Ekonomski fakultet, Hrvatska

Doc. dr Ana Jovancai,

Megatrend univerziteta, Srbija

USKLAĐIVANJE HRVATSKOG ENERGETSKOG ZAKONA SA ENERGETSKIM PAKETOM EVROPSKE UNIJE

S a ž e t a k

Od kada je Hrvatska stekla status kandidata za članstvo Evropske unije (EU) započela je sa usklađivanjem zakonodavstva u skladu sa propisima EU. Osim toga, hrvatski sektor za električnu energiju suočava se sa brojnim izazovima tako da su potrebne značajne promene u okviru zakonodavstva kako bi proces liberalizacije tržišta bio uspešan. Najveći izazov u hrvatskom sektoru električne energije je ostvariti 20% udela obnovljivih izvora energije (RES) u bruto energetske potrošnji do 2020. Hrvatska trenutno ima oko 15.1% RES u konačnoj bruto potrošnji energije jedan od načina da ostvari svoj cilj je da poveća kapacitet proizvodnje obnovljivih izvora energije u skladu sa malom potrošnjom energije. Pored toga, mogućnosti za uspostavljanje ekonomskog rasta putem inovacija i održive konkurentske prednosti u razvoju energetske politike, veoma su priznate u Hrvatskoj. Dakle, ukupna ulaganja u proizvodnju energije iz obnovljivih izvora imaće značajan uticaj na ekonomski rast i zaposlenost u ruralnim delovima zemlje a koja su u skladu sa strategijom EU RES.

Ključne reči: upravljanje, energetska strategija, obnovljivi izvori energije