

POTENTIALS OF HYDROELECTRIC POWER PLANT FINANCING THROUGH THE CONCEPT OF PUBLIC- PRIVATE PARTNERSHIP IN SERBIA

Introduction

The last half of the twentieth century was marked by strict control over energy sector by governments of countries. Accordingly, all electric power facilities, such as electric power plants, switchgear plants, transmission and distribution networks were financed from the public sector. However, the need to finance infrastructure projects in many countries around the world is growing faster than the financial resources, i.e. capital sources that could finance such projects. In their study, Merna and Njiru (2002) came to the conclusion that developed countries allot 200 billion dollars, which is 4% of their national output, a fifth of total investments and 40–60% of public investments in infrastructure.

Only towards the end of the twentieth century was there a subtle influx of private capital into the electric power sector. Private companies do not easily decide to invest money in power plants due to the relatively high risk and long periods of return on investment. That especially refers to hydroelectric power plants. For that reason, many countries have started harmonizing and designing legal regulations that encourage participation of the private sector in the development, financing,

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operationalization, i.e. shared ownership of infrastructure projects. The idea of including private investors in traditionally public (state) infrastructure projects conditioned the public-private partnership.

The public-private partnership phenomenon represents one of the most important legislative instruments in the world, especially within the European Union. It also represents a big opportunity for Serbia, since there is a great need for infrastructure investments. It has been known for a long time that due to permanently growing needs for improvement and construction of new facilities, public sector has never enough of its own financial resources. That is especially prominent in the sector of electric power generation. Therefore, many developing countries partially opened their markets for private investors through the process of privatization. Starting from short-term contracts, concession contracts, to joint investments, where there is shared ownership between the public and private sector, public-private partnerships (PPP) have an important place between traditional project implementation and complete privatization.

The research subject of this paper are modern methods of hydropower project financing. Hydroelectric power plants are production facilities that are special in many aspects, so, in accordance with that, their construction is complicated and requires enormous funds, knowledge and experience.

The main goal of the research is to point out new financing methods that could be applied in Serbia, as well as the significance of use of renewable energy sources. That is, above all, due to the fact that Serbian electric power industry is in continuous deficit, regarding both production and consumption of electrical energy. Moreover, it can be expected that consumption will increase in the future as well. Therefore, it is necessary to carry out the planned hydro projects. Regarding the development of electrical energy market, Serbia is significantly behind the rest of the world. Analyzing the experiences of developed countries and implementing them in Serbia, we get to the financing model that would certainly significantly improve the financing process.

The hypothesis that we will attempt to answer is:

- the motive for forming public-private partnership as a form of financing infrastructure projects is not solely of a financial nature.

The data used in the analysis are predominantly of secondary nature, i.e. based on already conducted research of already implemented projects.

The paper has been organized into several units. After the introductory chapter, the second chapter is dedicated to potentials of private financing sources for hydropower projects. The next chapter points to the role of hydropower sector in fulfilling needs for electrical energy. The fourth chapter presents a financing model for hydroelectric power plants in Serbia. The fifth chapter gives an answer to the given hypothesis, while the last chapter is dedicated to concluding remarks.

1. Participation of private capital in financing hydropower projects

Financing infrastructure projects can be implemented through foreign direct investments, commercial bank loans, export loans, international development bank loans, assets from bilateral and multilateral aid programs, as well as through different financial elements of capital market. Due to many options to include the private sector in the process of infrastructure project financing, there are numerous possibilities of combining public and private capital, which can go from one extreme to the other, i.e. the government can take on full responsibility and all project risks, or the private investor can do the same (Benkovic et al, 2012).

The idea of mixed finance appeared as economic necessity since many countries were not able to finance intensive infrastructure projects from their own sources. Mixed finance includes partnership of public and private capital. Since the 1990s public-private partnerships became the key instrument of public policy of many countries around the world (Osborne, 2000). Public-private partnership gives a possibility to the government to treat the whole project in a way which will take care of its share as well as interests of the users of the infrastructure project. Public interest of end users is protected by the government ensuring that the private investor fights for his profit in the fiercest competition possible with other investors in the same or similar private sector.

Apart from being profitable, public-private partnerships are also an efficient mechanism for investing public policy, as well as an important factor of society development. Partnership involves cooperation, i.e. 'to work or act together' and in a public policy can be defined as cooperation between people or organizations in the public or private sector for mutual benefit (Osborne, 2000). Guidelines for Private Public Partnership for Infrastructure Development by the United Nations and Economic Commission for Europe (2000) defines infrastructure as any legal and economic form that enables private means to be invested into public infrastructure and services.

Investment equipment providers, material and energy-generating product providers, as well as contractors can also, to a great extent, participate as investors and financiers in project finance. Apart from the abovementioned, leasing companies can also participate as owners of the equipment necessary for construction or operation of the project, less often as financiers. New conditions for every national economy functioning during the time of crisis exert great pressure on increasing productivity and creativity in attracting capital, improving organization, developing new technologies and human resources, creating new products and so on. Having this in mind, it is clear that one of the most significant things in the next period for economy of any

country is to attract the private capital as a potential for investing in projects and objects that will influence the development of economy.

That is also true for hydroelectric power plant construction projects, for which it is almost impossible to find funds solely from private sources. The form of financing most often found in the largest number of countries is based on a combination of own and borrowed funds. That ratio is mostly 3:1 in favor of borrowed funds (Head, 2006). Such projects include creation of a new local company, whose purpose is defined by a common goal of all capital owners. Based on project analysis in the area of hydropower so far, it can be established that the share of capital from private sources is most often around 27% of the project value (Head, 2006). The amount of own funds that are included in a project depends on the risk perception by the investor towards a specific project. The higher the risk, the larger the number of private investors in the total project value, by which risk allocation is achieved. At the same time, around 30% of funds for a project is most often provided by the public sector (Head, 2006).

Despite the fact that main construction works during the construction of a hydroelectric power plant are local, local financing sources are virtually non-existent. This statement primarily refers to poorer countries and countries in transition, including Serbia. The largest percentage of investors come from international sources and are contracted in foreign currency. The existing risk due to this type of financing is most often in devaluation of domestic currency, because of which, in countries around the world, public companies were not able to finance immediate liabilities on the basis of foreign loans. In order to avoid this threat, it is better to find financing sources for hydroelectric power plant construction in domestic currency. That is not an easy task at all, especially in countries where domestic currency is not stable and where there is no well developed capital market.

2. Role of hydropower sector in fulfillment of needs for electrical energy

Hydroelectric power plants, as facilities of electrical energy system, are very safe. Looking at the whole system, it is necessary that the expenses of production, transmission and distribution of electrical energy be as low as possible. Different types of hydroelectric power plants contribute to that the most, because they produce the cheapest energy and because they are economically most affordable. A well planned and constructed hydroelectric power plant cannot be an investment failure in any electrical energy system development concept; moreover, introduction of a hydroelectric power plant of any type into the system contributes to the strengthening of its economic stability.

Hydropower is different from other sources of energy in many aspects, so, according to that, its advantages and shortcomings are different as well (Energy Informative, 2012).

- Hydropower belongs to renewable sources (Petrović and Ćirović, 2012).
- Electrical energy produced in hydroelectric power plants can be presented as 'green', because its production does not pollute the environment.
- Hydropower is a very reliable source of electrical energy.
- Compared to thermal power plants and nuclear power plants, hydroelectric power plants are quite safe.

There are certain weaknesses in operation of hydroelectric power plants. Those weaknesses refer to the influence on the environment, high construction costs, problems that occur during drought years and limitations of available construction sites.

3. Financing models for hydroelectric power plants in Serbia

Financing models in hydropower had to be transformed in the last twenty years. All major projects in Europe and North America were carried out prior to 1990s. Almost all of them were financed by the governments of the countries and strong state energy corporations. This trend has been changing in the last decades (Milosavljevic and Benkovic, 2010). There are no unlimited government funds to fund serious hydropower projects. Therefore, cooperation of private and public capital is necessary.

In the context of the capability to collect necessary funds for implementation of a project, thermal power plants dominated over hydroelectric power plants. Capital owners were more willing to invest into electric power plants powered by fossil fuels, primarily electric power plants powered by natural gas, due to incomparably lower risk and their cost-effectiveness (Head, 2006).

At the time when electrical energy production from renewable sources is being stimulated and when people are striving to decrease carbon-dioxide emission into the atmosphere, the share of hydropower in the world is decreasing. Investment of private capital in the production of electrical energy is still 40:1 in favor of thermal power stations (Head, 2006). The main reason for that is lack of funds. Until 1990s, there was the Union of Electric Power Industries of Yugoslavia, which encompassed all electric power industries from Yugoslav republics. After the civil war, the Union fell apart, together with the country. The last production facility that was built in Serbia was 'Piroć' hydroelectric power plant, put into operation in 1990. Elektroprivreda Srbije (EPS – Electric Power Industry of Serbia) continued to operate independently in a country isolated by sanctions. The only goal in the conditions of isolation and lack of funds was to maintain the system. During the bombing of

Serbia in 1999, EPS suffered enormous losses measured in hundreds of millions of euros. Such an event would be too big a shock for electric power industries of much more developed countries.

After the political changes in 2000, there were large, but not so obvious works to renew the whole electrical energy system. It was necessary to revitalize electric power plants, renew and modernize the network and transformer substations and connect to the European network. All these projects required significant funds, that were partly provided from donations and partly from own sources. At the same time, gradual deregulation of electrical energy market started. The plan was to completely liberalize the market by 2015, although, considering the crisis in the country, that is unlikely to happen.

Following the directives from the European Union, there was an organizational transformation of the Electric Power Industry of Serbia. A vertically integrated company was divided into two independent business subjects, i.e. two public enterprises. The Electric Power Industry of Serbia today deals with the production of electrical energy and its distribution, while Serbian Transmission System and Market Operator (Elektromreža Srbije) deals with the transmission of electrical energy. Both companies are monopolists in their areas of business.

Within EPS there are 12 dependent business entities, out of which 7 are for the production of electrical energy and coal, and 5 for the distribution of electrical energy. As the demand for electrical energy is growing from year to year, the existing capacities are not enough. Each winter, due to consumption that exceeds production, EPS imports great amounts of electrical energy at quite high prices. There have been considerations of launching new production capacities.

Thermal power plants are not facilities that should be considered, due to depleting coal resources. As the only possible solution at this moment, there is the construction of new hydroelectric power plants. The projects that have been mentioned are HPP on the Velika Morava, HPP on the Drina, HPP on the Ibar, HPP Bistrica and HPP Đerdap 3. The preparations for the construction project of a hydroelectric power plant on the Ibar have probably advanced the most.

During 2009, Serbia and Italy have signed a protocol on cooperation in the area of energetics. EPS and an Italian company SECI Energia SpA were labelled strategic partners in projects for the production of electrical energy. In October of the same year, according to an agreement from Rome, it was decided that the first project in mutual cooperation be the construction of hydroelectric power plants on the Ibar. SECI Energia SpA company was founded in 2005 as a member of Gruppo Maccaferri. The company headquarters are in Bologna, Italy, and it specializes in the energy sector. The owner of the company is the Maccaferri family. For the purposes of the project, a special company named 'PD Ibarske hidroelektrane' was founded, in which ownership is divided between SECI and EPS in the ratio of 51:49. This is

a partnership of a public enterprise and a private company, with a strong support of the governments of both countries.

There are multiple goals to be achieved through the implementation of this project. The energy potential of the river Ibar is completely unexploited. By construction of new hydro power plants, the hydropotential of the Ibar would be partially exploited and that would influence the improvement of stability of the electrical energy system in Serbia. Economic subjects from our country would be employed to construct the facilities. Besides that, an investment of such a scope in a relatively undeveloped municipality would mean employment of local labor and partial activation of the economy.

At the same time, the municipality of Kraljevo would charge a resource fee for the use of the waters on its territory, which is about 2% to 3% of the revenue earned by hydroelectric power plants. All this has to be taken into consideration while making a decision on starting this and similar projects.

There were several options in relation to the number of hydroelectric power plants and their installed capacity. After longer consideration, a solution of 10 cascade impoundment hydro-power plants has been accepted. All 10 hydroelectric power plants were going to be constructed between Kraljevo and Raška, in the length of 55 km of the Ibar riverbed. The main obstacles for the construction of the power plants are towns and the road and railroad infrastructure. The Ibar Basin is relatively sparsely inhabited, which is an advantage.

The total installed power of all the planned hydroelectric power plants is 118 MW, with planned annual production of 443,400 MWh of electrical energy. The construction starting date is expected in 2013, and each electric power plant will successively be connected to the system. The construction of all 10 electric power plants is expected to be completed in 7 years.

The produced electrical energy could be sold at the markets of both Serbia and Italy. For the feasibility of the company, it would be much more profitable to sell the electrical energy at the Italian market, due to the economic price of electrical energy there. The cost structure would consist of the electrical energy costs, costs of transmission through Serbia, costs of border transmission from Serbia to Montenegro, costs of transmission through Montenegro, costs of transmission through an undersea cable to Italy and costs of green certificates in Italy (Institut za vodoprivredu „Jaroslav Čarni”, 2010).

In order to provide a reliable distribution of electrical energy in Italy, it is necessary for the agreement to be ratified by the Italian Parliament, and to ensure sales of one MWh of electrical energy out of the power plant at 150 euros in the first 15 years of operation. After those 15 years, the price of electrical energy would be 55 euros per one MWh. Respecting the abovementioned prices of electrical energy, investment costs and planned production of electrical energy, internal rate of return in the event

of selling electric energy in Italy is 15%, while the current net value of the project is around 140 million euros. Based on these dynamic indicators of profitability, it can be concluded that the project is very attractive (Institut za vodoprivredu „Jaroslav Čarni”, 2010). When it comes to the Serbian market, the price of electrical energy is extremely low, so the indicators of project profitability would be far worse than in the case of selling it in Italy.

The estimated value of the project is over 300 million euros. That amount should be provided from loans and own funds of the investors. The ratio of borrowed and own capital will be 75:25. Grace period should be equal to the length of construction of all hydro power plants. The interest rate during the construction is planned to be 6%, while, in the period of loan repayment, it would be 7%. After the completion of the project, the loan would be paid off in 15 years.

It is likely that international development banks would need to be included in the implementation of such a project, above all, the European Bank for Reconstruction and Development (EBRD), which is interested in financing projects of renewable energy sources exploitation. Supported by the governments of Italy and Serbia, it is likely that international development banks will be included in the project more easily.

As it has been mentioned, the construction starting date for the first hydroelectric power plant was planned for 2013. At the moment, the necessary permits are being collected, the blueprints for individual power plants are being created, as well as the technical documentation, etc. The spatial plan for special-purpose areas has been accepted, a general blueprint for all hydroelectric power plants has been created and revised.

4. Discussion

The operation of hydroelectric power plants is undoubtedly very important for an electric power system to function well. Due to its maneuverability and relatively inexpensive electrical energy that it produces, this type of power plant cannot be compared to any other. Hydroelectric power plants are still the only type of use of renewable energy sources, which is economically justified. The fact is that there is a constant increase in demand for electrical energy in the world, while the fossil fuel resources, the main energy source on the planet, are diminishing every day. Logically, it can be concluded that hydropower will, in the future, be the energetic base in a large number of countries.

The most serious problem with hydroelectric power plants is their financing. Most power plants, until 1990s, were built from government funds, in the world and in our country. In those years, there were serious changes in the electrical energy market, as well as in the world economy in general. Government funds do not have

enough means any more to fund large energy projects. There was a need to include private capital, which will, supported by governments of countries, implement large hydropower projects.

The countries that should serve as an example to us have gone a long way ahead in the application of contemporary financing methods of hydroelectric power plants. They have found ways to successfully implement such projects. Attracting domestic and foreign investors and supporting them, they have built dozens of large energy facilities. From successful examples it can be seen that the time between the initial studies and putting a hydroelectric power plant into operation is quite long. It took more than ten years to complete an individual project. The main point is that there is awareness of the need to construct hydroelectric power plants, not only for economic reasons, but for energy safety in the future. That also provides the answer to the defined hypothesis.

Conclusions

Serbia is significantly behind the world in liberalization of the electrical energy market and investments into the energy sector. Political instability in the last few decades slowed down the reforms in all areas more than it was necessary. The newest power plant in Serbia was built 22 years ago, which is incomprehensible in normal economies. In order to provide new investments, it is necessary to understand that electrical energy is a commodity that, as any other, has its price. In the last ten years or so, there have been thoughts on potential locations for new hydropower plants and strategic partners to cooperate with, who are ready to invest funds. Public-private partnerships should give significant support for further investments, because they are one of the best methods to include private capital in important infrastructure projects. This law should offer support to all the interested parties, but also provide reliable and clean sources for production of electrical energy, without which contemporary life would be impossible to imagine.

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POTENTIALS OF HYDROELECTRIC POWER PLANT FINANCING THROUGH THE CONCEPT OF PUBLIC-PRIVATE PARTNERSHIP IN SERBIA

Abstract

In the last few decades, the participation of private sources in financing energy projects has become an attractive way to obtain the missing capital. This organizational structure defines the rights and responsibilities of partners, which enables a distribution of responsibility connected to providing the needed resources and risk allocation among the partners. The research subject of this paper are modern methods of hydropower project financing. Hydroelectric power plants are production facilities that are special in many aspects, therefore their construction is complicated and requires enormous funds, knowledge and experience. The main goal of the research is to point out new financing methods that could be applied in Serbia, as well as the significance of use of renewable energy sources.

KEY WORDS: PUBLIC-PRIVATE PARTNERSHIP, HYDROELECTRIC POWER PLANT FINANCING IN SERBIA, RENEWABLE ENERGY SOURCES IN SERBIA

MOŻLIWOŚCI FINANSOWANIA ELEKTROWNI WODNYCH Z WYKORZYSTANIEM KONCEPCJI PARTNERSTWA PUBLICZNO-PRYWATNEGO W SERBII

Streszczenie

W ciągu ostatnich kilku dekad partycypacja źródeł prywatnych w finansowaniu projektów energetycznych stała się atrakcyjnym sposobem pozyskania brakującego kapitału. Ta struktura organizacyjna definiuje prawa i obowiązki partnerów, co umożliwia rozproszenie odpowiedzialności związanej z dostarczeniem potrzebnych zasobów oraz alokację ryzyka wśród partnerów. Tematem badawczym artykułu są metody finansowania projektów hydroenergetycznych. Elektrownie wodne są zakładami wyjątkowymi pod wieloma względami, i dlatego ich budowa jest złożona oraz wymaga ogromnych nakładów finansowych, wiedzy oraz doświadczenia. Głównym celem badania jest wskazanie nowych metod finansowania, które mogłyby zostać zastosowane w Serbii, a także podkreślenie znaczenia odnawialnych źródeł energii.

**SŁOWA KLUCZOWE: PARTNERSTWO PUBLICZNO-PRYWATNE, FINANSOWANIE
ELEKTROWNI WODNYCH W SERBII, ODNAWIALNE ŹRÓDŁA ENERGII W SERBII**