Construction of hydroelectric power plants on the lower course of the Sava River

Opening of HPP Brežice with Reservoir

Public Information Notice

Brežice, 27 September 2017
Implementation of the project to build HPPs on the lower course of the Sava River

The company Hidroelektrarne na Spodnji Savi (HESS, d.o.o.) is leading the construction of one of the biggest energy generation projects not only in the country but also in the wider region. This multipurpose project involves the construction of five hydroelectric power plants: the already completed HPP Boštanj, HPP Arto-Blanca, HPP Krško and HPP Brežice, as well as HPP Mokrice, which is in the process of obtaining environmental approval.

As one of few companies specializing in hydro energy, HESS possesses the expertise and experience needed to lead and coordinate a project of such scope and scale – from siting and construction to operation and maintenance of hydroelectric power plants, all of which makes it highly competitive. Since all the project activities are closely intertwined, the leading authority behind the construction of the energy generation part of the project is required to effectively organize and coordinate all project participants and to ensure that all work is completed on time and in a concerted manner.

The project to build a chain of five hydroelectric power plants on the lower course of the Sava River was started in December 2002. Since then, a new hydroelectric power plant was completed every 44 months on average. Over the last 10 years, however, few new hydroelectric power plants have been built across Europe because all economically viable rivers have already been tapped, which in turn results in substantial knowledge of building such facilities being lost.

From day one, the project to build hydroelectric power plants on the lower course of the Sava River has been carefully planned and effectively run and supervised, which allowed the existing hydroelectric power plants to be completed within their schedules and allocated budgets. On top of that, the project presents an opportunity for the local economy since the construction and equipment development operations are almost exclusively based on domestic know-how.

The goals of this investment pursued by the company have been set primarily to ensure that Slovenia’s economy stays competitive and capable of building large energy generation and water management facilities. The construction of such reliable facilities for generating electricity from renewable energy sources is of vital importance for Slovenia, since they harness a renewable and environmentally friendly energy source that will provide electricity at affordable and at the same time very competitive prices.

The key benefit of generating electricity at hydroelectric power plants – as opposed to other renewable sources – is that the production output can be very accurately forecast 24 hours in advance. From the viewpoint of the electricity market, which operates on the principle of hourly and daily forecasts, this provides a strong competitive edge compared to the rest of renewable energy sources. Also, the construction of HPP Brežice facilitates a higher degree of flexibility in production terms, since the chain of hydroelectric power plants on the lower course of the Sava River will be able to generate larger amounts of base- and peak-load electricity exactly when the national power grid needs it the most.

To ensure optimal operation, the chain of hydroelectric power plants on the lower course of the Sava River also includes HPP Mokrice. The construction of the next hydroelectric power plant in the chain is therefore crucial because it is the only way we will be able to fully utilize
the planned capacity of the hydroelectric power plants on the lower course of the Sava and the maximum flexibility offered by the chain as a whole.

**HPP Brežice construction details and technical data**

**Project timeline:**
- Start of construction: April 2014.
- First water-driven spinning of generating unit 1: December 2016.
- Finalization of all work: July 2017.
- Filling of the reservoir to the nominal elevation of 153.00 m a.s.l.: August 2017.
- Start of one-year trial operation: September 2017.

**Amount of work and quantities of installed materials:**
- Concrete 82,000 m³
- Reinforcement steel 5,300 tonnes
- Volume of earthworks 1,400,000 m³
- Estimated time for work and equipment installation 3,000,000 hours

**Technical data:**
- Number of generating units, vertical Kaplan turbine 3
- Number of spillways 5
- Headwater elevation 153.00 m a.s.l.
- Installed plant capacity 45.3 MW (3 x 15.1 MW)
- Rated head 11.00 m
- Average annual output 161 GWh
- Mean annual discharge 207 m³/s
- Reservoir capacity 19.3 million m³
- Reservoir live storage 3.4 million m³

Financial information:
The projected realized value of investments in the construction of the energy generation part of HPP Brežice totals EUR 113 million, exclusive of financing costs, which is some 4% below the level from the planned investment programme.

To learn more about the realized values and investment programmes by individual HPP, see the table below (values expressed in EUR):

<table>
<thead>
<tr>
<th>HPPs on the lower course of the Sava</th>
<th>Realized value</th>
<th>Investment programme</th>
<th>IND RE / Invest program</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPP Brežice</td>
<td>113,000,000</td>
<td>118,120,658</td>
<td>96</td>
</tr>
<tr>
<td>HPP Krško</td>
<td>97,009,025</td>
<td>102,855,000</td>
<td>94</td>
</tr>
<tr>
<td>HPP Arto - Blanca</td>
<td>92,635,530</td>
<td>89,818,000</td>
<td>103</td>
</tr>
<tr>
<td>HPP Boštanj</td>
<td>66,976,651</td>
<td>66,812,000</td>
<td>100</td>
</tr>
<tr>
<td>Total investment costs for HPP Boštanj, HPP Arto-Blanca, HPP Krško and HPP Brežice</td>
<td>369,621,206</td>
<td>377,605,658</td>
<td>98</td>
</tr>
</tbody>
</table>

Capital expenditures for HPPs on the lower course of the Sava

| HPP Boštanj | 66.8 | 67.0 |
| HPP Arto - Blanca | 89.8 | 92.6 |
| HPP Krško | 102.9 | 97.0 |
| HPP Brežice | 118.1 | 113.0 |

Total investment costs for HPP Boštanj, HPP Arto-Blanca, HPP Krško and HPP Brežice

In EUR million

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Impact of the construction of hydroelectric power plants on the budget of the Republic of Slovenia:

An analysis of direct and indirect financial impacts of the project to build hydroelectric power plants on the lower course of the Sava River on the budget of the Republic of Slovenia and the budgets of the local communities clearly demonstrates that this is a sound, long-term financial public investment made by the State. The figure below shows that during the concession period (50 years) the budget of the Republic of Slovenia will receive around six times as much resources as the State, or the concession granting authority, needs to put in for the construction of the HPPs on the lower course of the Sava.

THE PROJECT’S SIGNIFICANCE FOR THE NATIONAL BUDGET

Six times as much resources as were originally spent on the infrastructure investment will be paid back into the budget of the Republic of Slovenia.

Investments in the construction of the chain of HPPs and its financial impacts on the budget of the Republic of Slovenia

In EUR million

The project to build hydroelectric power plants on the lower course of the Sava River serves multiple purposes. Its ultimate purpose, however, can only be fulfilled by capturing all the synergies created between the energy generation and infrastructural parts of the project, as well as between the local communities and the State. Beyond any doubt, the planning and implementation of this project is a fine example of good practice for all similar future projects.