ROMANIA

Hydropower Business Opportunities – 16 Projects

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Hidroelectrica SA – 16 business opportunities for US companies - http://www.hidroelectrica.ro.

1. NAME OF THE INVESTMENT
"Rehabilitation of Bradisor HPP"

LOCATION OF INVESTMENT
The Brădișor dam and water storage are located in the Lotru river basin, 6 km downstream from Malaia and 17 km upstream from Brezoi, on the DN7A Brezoi-Voineasa road. Brădișor Dam is located on the lower course of the Lotru River, 67 km downstream from the spring. The elevation of the crown of the Brădișor dam is 457.00 masl.

Brădişor hydro power plant is of underground type, located at approx. 400 m downstream of the dam, at a depth of approx. 150 m below the level of the Lotru riverbed. Access to the plant is through a long tunnel of approx. 900 m, with a slope of 10.3%. The cavern of the power plant has the following dimensions: length L= 48.15 m; width l = 14.10 m; height H = 35 m.
The Brădișor hydropower development (dam, water storage, main hydraulic shaft and underground power plant, with all component objectives)

Specific objectives
The specific objective of the investment is the refurbishment of the existing installations by upgrading the technologies or replacing the installations with modern installations, thus contributing to the increase of the renewable energy production capacity, and contributing more efficiently to the environmental mitigation measures.
The main objective of the rehabilitation project was analyzed and established in the light of the objective of ensuring and improving energy security and leads to the increase of the production capacity by eliminating the power restrictions of the hydro units that have already reached their lifetime.

DESCRIPTION OF THE INVESTMENT (SELECTED OPTION)
By refurbishing the Brădișor HPP, the replacement of the suction cone, the spiral case with the cylindrical stator with new parts, the turbine rotor, the turbine shaft and the wicket gate will be carried out, as well as the replacement of the 130 MVA power transformer with a new 130 MVA power transformer and the replacement of the Ol-Al conductor with dry cable on the gallery area for the energy evacuation system by bringing the hydro units to the project energy parameters.

VALUE
170,372,656.00 Ron (VAT excluded) – approx. 37,860,590 USD

IMPLEMENTATION
Total time of the investment objective: 48 months

2. NAME OF THE INVESTMENT
Hydropower development of the Jiu River on Livezeni Bumbești sector

LOCATION OF INVESTMENT
The investment objective "Hydropower development of the Jiu river on Livezeni-Bumbești sector" is located on the Jiu sector, on a length of approx.20 km and a head of 263 m, between Livezeni locality, Hunedoara county and the

confluence with Sadu river, Gorj county.

Strategic context at European level

The European Union's policy is traditionally aimed at protecting the environment and encouraging investment in green technologies. In practice, it is desirable that all parts of society and all economic sectors play a role in this political, economic and social project – ranging from energy, industry, mobility, buildings, to agriculture and forestry.
The trends in this regard have been some that have strengthened the pressure towards limiting/suppressing CO2 emissions, the target being that the entire EU economy should become neutral carbon by 2050. The European Union promotes the transition to a climate-neutral society by seeing it as both an urgent challenge and an opportunity to build a better future for all citizens.

OBJECTIVES OF THE INVESTMENT

The specific objective of the investment is to increase renewable energy generation capacity through the development of adjacent plants and systems.

VALUE

AHE Livezeni Bumbesti – approx. 350 million RON = 77.778 million USD

3. NAME OF THE INVESTMENT

Exploitation of the energy potential of water on the Olt river, Cornetu-Avrig sector, step Caineni HPP

LOCATION OF INVESTMENT

Caineni HPP is located in the gorge of the Olt river, on the territory of Vâlcea county, downstream of the confluence of the Olt river with the Boia Mare river, being framed upstream of Lotrioara HPP, and downstream of Robești HPP.

Strategic context at European level

The European Union's policy is traditionally aimed at protecting the environment and encouraging the investments in green technologies. In practice, it is desirable that all parts of society and all economic sectors play a role in this political, economic and social project – ranging from energy, industry, mobility, buildings, to agriculture and forestry.
The trends in this regard have been some that have strengthened the pressure towards limiting/suppressing CO2 emissions, the target being that the entire EU economy should become neutral carbon by 2050. The European Union promotes the transition to a climate-neutral society by seeing it as both an urgent challenge and an opportunity to build a better future for all citizens.

Strategic context at national level

Water Law no. 107/1996, as subsequently amended and supplemented, defined at national level the basins/hydrographical spaces, Olt river included, for which the Management Plans were developed.
All future infrastructure projects are mainly subject to the following types of activities:
A. Flood risk management
B. Power generation in hydropower plants
C. Water supply for irrigation
D. Ensuring the conditions of road, rail and navigation transport.
E. Reducing River erosion.
F. Infrastructure for water supply and sewerage – treatment of localities.
HPP Caineni main objective is B power generation (75%), but is also covers the points A, indirectly C, D and E as non-energetic functions (25%).

The **specific objective** of the investment is to increase renewable energy generation capacity through the development of adjacent plants and systems.

Caineni HPP is approximately 60% complete.

The **remaining works (40% of total investment)** needed to complete the objective are:

- storage lake
- the hydropower plant of the dam type located in the front, aligned with the spillway dam
- spillway dam
- access to the upstream hydrotechnical knot on the right bank dam crest.
- Connection to NES made by own 110 kV substation, equipped with 10.5/110kV high voltage transformers.

4. NAME OF THE INVESTMENT

"Cerna - Belareca Hydropower Development"

LOCATION OF INVESTMENT

The investment objective of Cerna – Belareca HPD is located in the area of the Cerna Mountains located in the southwestern part of the country, Caras – Severin County, on the administrative territory of Baile Herculane, Cornereva Commune and Mehadia Commune.

Strategic context

Romania has a privileged position regarding the share of renewable energies in the national energy mix, but the total consumption needs make it obvious that the effort to capitalize on these resources must be accelerated and optimized. Consequently, the situation requires the identification without delay of concrete solutions, with a short and medium horizon of implementation, and in particular the unblocking of energy projects that are at an advanced stage of implementation.

The **specific objective of the investment** is to increase renewable energy generation capacity through the development of adjacent plants and systems.

The physical stage of percent complete is 82%.

The **remaining works (18% of total investment)** needed to complete de the objective are:

- Hydrotechnical constructions at the Cornereva dam
- mechanical and electrical equipment
- 1 hydro unit
- Mechanical and electrical auxiliary installations
- SCADA command, control and automation systems
- measuring and control devices
- Connection to the national energy system and power supply

VALUE : approx. 329 million RON = 73.111 million USD

5. NAME OF THE INVESTMENT

Rehabilitation of Râul Mare Retezat HPP

LOCATION OF INVESTMENT

The development of the Râul-Mare upper reservoir is located at the northern extremity of the Godeanu massif, respectively in the SW part of the Retezat massif and the SE part of Tarcău mountains, crossing the "Retezat National Park".

Overall objective

Hydropower is a sustainable way to generate energy at low cost and with minimal impact on the environment. Even if the need to reduce dependence on energy imports is acute, the proposed investments will do so in the medium and long term. At the same time, they are meant to ensure a sustainable management of the water resource, reducing the undesirable effects of floodings and depletion phenomena.

The specific objective of the investment is the refurbishment of the existing installations by upgrading the technologies or replacing the installations with modern installations, thus contributing to the increase of the renewable energy production capacity and contributing more efficiently to the environmental mitigation measures.

DESCRIPTION OF THE INVESTMENT (SELECTED OPTION)

The rehabilitation works consisting in particular of the rehabilitation or replacement of mechanical and electrical equipment and related installations

The total **estimated value** of the investment is:

- **Ron 770,585,704 (VAT excluded) = approx. 171,241,267 USD**

The duration of the investment objective is 72 months (6 years)

6. NAME OF THE INVESTMENT

Cerna Motru Tismana Hydrotechnical and Energy Complex. Second Stage.

LOCATION OF INVESTMENT

Investment objective "Cerna-Motru-Tismana Hydrotechnical and Energy Complex . Second Stage" is located in the hydrographical basin of Tismana and Bistrița rivers: Tismana, Bistrița, Clocotiș, Vâja localities, Gorj County.

Cerna Motru Tismana Hydrotechnical and Energy Complex. Second Stage main objective is power generation (78%), but is also covers as non-energetic functions (22%).

OBJECTIVES OF THE INVESTMENT

The specific objective of the investment is to increase renewable energy generation capacity through the development of adjacent plants and systems.

The current physical stage of performing the investment objective is 60% complete

By completing the **remaining works** estimated by the Feasibility Study at **196 million lei = 43.55 million USD** and commissioning the objective at the entire capacity, a generation of electricity from renewable sources with a total installed power of 119 MWh and an annual generation of green energy of 288 GWh/year would be obtained.

7. NAME OF THE INVESTMENT

The hydropower development of Siret river on Cosmești – Movileni sector. Cosmești HPP

LOCATION OF INVESTMENT

The investment is located in the hydrographical basin of the Siret river, on the territory of the communes of Nicoresti and Cosmești in Galați county, as well as the right of Marașești town in Vrancea county.

OBJECTIVES OF THE INVESTMENT

The specific objective of the investment is to increase renewable energy generation capacity through the development of adjacent plants and systems.

EXISTING SITUATION

The physical stage of the works at the stage of Cosmești HPP:

- Civil works: 40%
- Mechanical and electrical equipment: 0%.

The **remaining works (60% of total investment)** needed to complete the objective are

- Cosmesti storage
- Cosmesti HPP
- Cosmești Hydropower Plant
- The Cosmești dam
- The volume of the lake of 19.08 million cubic meters

Value: approx. 892 million RON = 198.2 million USD

8. NAME OF THE INVESTMENT

Hydropower development of the Olt river on Izbiceni – Danube sector. Islaz HPP

LOCATION OF INVESTMENT

The investment is located at the end of the hydropower cascade on the lower course of the Olt river, on Izbiceni-Danube sector. Thelocation of the hydrotechnical knot is at approx. 3.5 km upstream of the confluence of Olt River and the Danube River.

EXISTING SITUATION

Physical status of the works: 0%

The investment objective does not present works and constructions in the field.

VALUE: 2,2 billions RON = 489 million USD

9. NAME OF THE INVESTMENT

Exploitation of the energy potential of water on Olt river, Cornetu-Avrig sector, Lotrioara HPP step

LOCATION OF INVESTMENT

Lotrioara HPP is located in the minor riverbed of Olt at approx. 600 m upstream of the discharge into the Olt river of Lotrioara stream, near the town of Lazaret, Sibiu County.

EXISTING SITUATION

The physical stage of the works at Lotrioara HPP step:

• Civil works: 1%

• Mechanical and electrical equipment: 0%.

By completing the **remaining works** estimated by the Feasibility Study at **386 million lei = 85.77 million USD** and putting the objective into operation, a production capacity from renewable sources with an installed power of 14MWh and an annual production of green energy of 53.2 GWh/year will be obtained.

The development scheme consists of the following main objects:

- storage lake
- the hydropower plant of the dam type located in the front, aligned with the spillway dam
- 2 hydro units
- Mechanical and electrical auxiliary installations
- SCADA command, control and automation systems
- spillway dam equipped with 4 dams
- access to the upstream hydrotechnical knot
- Connection to NES made by own 110 kV substation, equipped with 10.5/110kV high voltage transformers.

10. NAME OF THE INVESTMENT

Pașcani hydropower development

LOCATION OF INVESTMENT

Pașcani hydropower development includes Pașcani storage and Pașcani Hydropower Plant and is located on Siret River upstream of Lunca, Iași County.

The perimeter of interest is located in the meadow of Siret river, between the localities Lunca and Heci. Iași County

From a geomorphological point of view, the perimeter of the development falls within the meadow of the Siret River, which crosses on a general direction NNW-SSE Sucevei Plateau.

The site of the storage is located on Siret River, about 2.5 km upstream from the town of Pașcani.

EXISTING SITUATION

The physical stage of the works at HPP Pascani is 70%, as follows:

• General construction of buildings and civil engineering works

• Mechanical and electrical equipment: 60%.

By completing the **remaining works** to be executed estimated by the Feasibility Study at **319,9 million lei = 71.111**

million USD and commissioning the objective, a generation capacity from renewable sources with an installed power of 9.4 MW and an annual generation of green energy of 25.3 GWh/year.

The development scheme consists of the following main objects:

- Pașcani storage has a total water volume of 68.7 million cubic meters
- The right bank dam has a length of about 10400 m
- The left bank levee with a height of 17m, a length of about 1540m
- Pașcani hydro power plant is an above-ground power plant
- Pașcani dam
- The evacuation of the electricity generated by Pașcani HPP is made by connecting HU1 and HU2+HU3 in the 20kV substation - Vatra through 2 LES 20kV.

11. NAME OF THE INVESTMENT

Exploitation of the energy potential of water on the Olt river, Cornetu-Avrig sector, step Racovița HPP

LOCATION OF INVESTMENT

The hydrotechnical knot is located in the lower terrace area on the right bank of the Olt River, at approx. 1.8 km upstream of Sebeș-Olt train station. The HPP is located on the central embankment front, to the left of the spillway dam.

EXISTING SITUATION

Racovita HPP (presently 88% complete) operates with power limitation due to the failure to achieve the remaining of the downstream works, which consists mainly of the railroad bridges that require consolidation or replacement. The estimated loss of energy due to the uncompleted works is approximately 30GWh/year, energy that would ensure the supply of over 100,000 households.

By completing the **remaining works** estimated by the Feasibility Study at **86 million lei = 19.111 million USD** and commissioning the objective at the entire capacity, a generation of electricity from renewable sources with a total installed power of 31.5 MWh and an annual generation of green energy of 71.6 GWh/year would be obtained.

The remaining works (12% of total investment) needed to complete the objective are:

✓ Completion of the works on the left bank embankment;
✓ Protection of railroad bridges on Marșa and Avrig rivers;
✓ Protection of downstream railroad bridges crossing the outlet channel/new bridge;
✓ Completion of works at the outlet channel.

12. NAME OF INVESTMENT

“Rastolița Hydropower Development”

LOCATION OF INVESTMENT

Răstolița HPD is located in the northeastern part of Mureș County, in the Mureș narrow pas area, between Lunca Bradului and Deda localities.

EXISTING SITUATION
The physical stage of achieving the investment objective at minimum energy (dam level 720masl) is 77%.
The rest of the works to be executed for the achievement of first stage at minimum energy level (720masl dam elevation) consist of:
- completion of works on the dam, headrace and secondary catchments of the West Branch.
- completion of installation works of mechanical and electrical equipment and installations at the main headrace, the pressure knot, the power plant, and the 110 kV transformer station.
- connection to the National Energy System (NES).

VALUE: approx. 742 million RON = 165 million USD

13. NAME OF THE INVESTMENT

Rehabilitation of Vidraru Hydropower Development

LOCATION OF INVESTMENT
The Vidraru hydropower plant , having an installed power of 220MW, is located on the right bank of the Argeș River in a cave located at 104 m below the level of the river, with the role of producing 409 GWh/year electricity by using the hydropower potential available in the Vidraru reservoir and to participate in the frequency-power adjustment in the National Energy System while providing system services.

The existing situation for investment purpose
The economic instability determined by the increase in the prices of equipment, materials, labor and a legislative framework in constant change, it was found necessary to update the General Estimate and the technical and economic indicators for the investment objective "Rehabilitation of the Vidraru HD". The rehabilitation and refurbishment works provided in the updating documentation remain unchanged compared to the recommended and approved scenario within the initial Feasibility Study.
Thus, the investment objective "Rehabilitation of the Vidraru HD" goes through the procedure of re-approval of the technical and economic indicators following the update of the General Estimate for the recommended scenario, without intervening on the proposed technical solution.

The existing technical situation
The main components of the development are: the Vidraru dam, the water intake, the by-pass and the power plant. The by-pass includes pressure adduction, the surge tank, the gate house from the pressure well, the manifold and the tailrace gallery.
VALUE: Ron 866,557,458 (VAT exclusive) = 192,568,324 USD

The technical support services will be provided by the General Designer, within the "turnkey" rehabilitation contract.

According to the indicative schedule for the achievement of the investment and the main stages, including the drainage/filling period of the reservoir, the duration of the achievement of the **investment objective is 8 years (96 months)**

14. NAME OF THE INVESTMENT

Rehabilitation of Mărișelu HPP - equipment and construction part

LOCATION OF INVESTMENT
The Mărișelu HPP is located in the hydrographical basin of the Someșul Cald River, downstream of the Fântânele reservoir, in the area that separates the Gilău Mountains from the Vlădeasa Mountains within the Apuseni Carpathians, upstream of the city of Cluj-Napoca.

The existing situation for investment purpose
The investment objective "Rehabilitation of Mărișelu HPP equipment and construction part" was approved in 2016, by the Decision of the General Meeting of Shareholders no. 5/May 3, 2016, based on the Feasibility Study prepared in 2014.
Considering the long period since the Feasibility Study and the context of economic instability, in order to obtain an assessment correlated with the evolution of prices for equipment and works, it was found necessary to update the Feasibility Study.
The existing technical situation
The **Mărișelu hydropower development** was designed as a complex development with the following **functions**:
 producing 390 GWh/year of electricity by using the hydropower potential available in the Fountains reservoir;
 participating in frequency and power adjustment in the National Energy System;
 regulating the flows and damping the flash flood waves eliminating the danger of flooding in the downstream riparian areas;
 creating water volumes for the development of fish farming.

VALUE: approx. 600,000,000 lei (VAT excluded) = 133,333,000 USD

According to the indicative schedule for the achievement of the investment and the main stages, including the drainage/filling period of the reservoir, the **duration** of the achievement of the investment objective is **72 months (6 years)**

15. NAME OF THE INVESTMENT

"Rehabilitation of the high-power pumping stations Petrimanu, Jidoaia and Lotru Aval"

LOCATION OF INVESTMENT
Within the hydropower development of the Lotru river, the secondary catchment and adduction system ensures the collection of the flows from both the Lotru basin and the neighboring basins, transporting them by gravity or by pumping them in the Vidra accumulation, in order to increase the tributary flow from 4.3 to 18.7 m3/s.

The components **subject to rehabilitation** are: bottom emptying; water intakes of hydro units, pumping station, with mechanical equipment and installations, primary electrical equipment and installations, secondary electrical equipment and installations, construction part and the related installation part.

VALUE: 357.286.943 Ron = 79,397,098 USD

The **estimated duration of the works** to be carried out for the objects included in the investment is **57 months**.

16. NAME OF THE INVESTMENT

Surduc-Siriu Hydropower Development. Surduc - Siriu step

LOCATION OF INVESTMENT
The objectives of Surduc-Siriu HPD investment are located as follows:
The Hydropower Plant is located in Nehoiu, Buzău County;
- Surduc Dam in Covasna County, on Bâsca Mare river, near the border with Buzău county.

EXISTING SITUATION
Physical status of the works:
- Siriu-Nehoiașu step (served by Siriu Dam, belonging to Romanian Waters N.A.):
• commissioned since 1988.
- Surduc-Nehoiașu step (in progress):
• Civil works: 78%;
• Mechanical and electrical equipment: 0%.
- Cireșu-Surduc step (works interrupted since 1994):
• Civil works: 20%;
• Mechanical and electrical equipment: 30%.

By completing the **remaining works** estimated by the Feasibility Study at **440,54 million lei = 97.9 million USD** and commissioning the objective at the entire capacity, a generation of electricity from renewable sources with a total installed power of 55 MWh and an annual generation of green energy of 152 GWh/year would be obtained.