***FOR THE CONSTRUCTION AND OPERATION BY CONCESSION OF THE HYDROPOWER PLANTS ON THE DUSHAR-ZEREC STREAM***

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2. **ESTIMATE OF THE HPPs’ BUDGETS**

The following table represents a summary estimation of the investment cost of HPP 1.





The following table represents a summary estimation of the investment cost of HPP 2.





The following table shows a summery of bill of quantities for the construction of the two hydropower plants as well as the respective chart:





1. **MAIN DATA**

* Capacity: 1’865 kW
* HPP 1 550 kW
* HPP 2 1’315 kW
* Annual electricity production: 10’000’000 kWh
* HPP 1 3’000’000 kWh
* HPP 2 7’000’000 kWh
* Concessionarie Fee 2.5%
* Selling Price: 0.067 EUR/kWh
* Price Increase 1% per year
* Inflation 3%
* Discount rate 12%
* Concession term 35 years
* Construction Period 16 months
* Initial Invesstment 1’428’008 EUR
* HPP 1 449’226 EUR
* HPP 2 978’781 EUR
* Bank Loan: 70% of initial investment
* Loan Interest: 10%
* Loan Payment: 10 years
* Own Capital: 428’40252 EUR
* Bank Loan: 999’60548 EUR
* Annual Operative Expenses: 5% of initial investment



Construction Schedule:



**Electricity selling price and revenues calculation:**

The electricity selling price based upon the decision no.27, dated datë 19.01.2007 is determined by Energy Regulatory Entity by the following formula:

*Selling price (Euro/kWh) = Average price of electricity import realized the previous year*

*(Euro/kWh) X Coeficient 1.04*

Based on ERE decision this price is 9.37 EUR/kWh with an exchange rate of 140 ALL/EUR it results 6693 EUR/MWh. In order to calculate the revenues the selling price for the first year is assumed 6693 EUR/MWh with an annual increase for the following years of 2% less then the supposed inflation rate of 3%. So the price increase is assumed 1% per year. Also in order to calculate the revenues it is taken into consideration the concessionaire fee of 2.5% of the annual electricity generated.

1. **FUNDING SOURCES**

The funding sources of the project are bank loan and own capital. The following table summerizes the funding sources by value and percentage:

|  |  |
| --- | --- |
| **Description** | **Value** |
| Total value to be funded - EUR | **1’428’008** |
| From which: | |
| Investment value funded by own capital - EUR | 428’40252 |
| Investment value funded by bank loan - EUR | 999’60548 |
| **In %** | |
| Total value to be funded | 100% |
| Investment value funded by own capital | 30% |
| Investment value funded by bank loan | 70% |

**Loan amortization schedule:**

The conditions of the bank loan of a total value of 999’60548 EUR are shown in the following table:











1. FINANCIAL PLAN

In order to compile the profit and loss statement, cash flow statement and to evaluate the investment, the following is taken into consideration:

1. Construction period of the hydropower plants is 16 months;
2. Concession term 1s 35 years including the construction period;
3. annual average electricity generation – 10,000,000 kWh;
4. the investment will be realized as follows:
   1. during the first year of construction will be invested 169,734,107 EUR; and
   2. during the second year of construction will be invested 30,186,989 EUR.
5. Electricity selling price willbe 9.37 EUR/kWh for the first year and for the following years there is forecasted a price increase of 1% per year;
6. Annual operative expenses (staff cost, maintenance expenses, administrative expenses) in order to have a normal operation of the HPPs is assumed 5% of the initial investment for the first years, followed by a yearly increase of 3% for the following years (inflation rate);
7. Interest expenses are based on the loan amortization schedule;
8. Depreciation is assumed linear for the utilization period of the assets (buildings, machineries and equipment, grid lines etc.);
9. Tax on profit is assumed 15%;
10. In the 25th year of operation there is forecasted a reinvestment. This reinvestment is 60% of the investment in the equipment and is indexed with the inflation rate of 3%;
11. The discount rate in order to evaluate the feasibility of the project is assumed 12%.
12. **LOSS AND PROFIT STATEMENT**

The profit and loss statement is compiled based on the above-mentioned assumptions. The following table represents the sales, operative expenses and profit for the whole concession term. Also there is given the chart presentation of the operative expenses (which include personnel expenses, maintenace expenses, electricity expenses, intrests, etc.) for the operation period as well as the chart presentation of total operative expenses and net profit.









1. **CASH FLOWS STATEMENT**

**Cash flow** of the project which is funded 70% by bank loan and 30% by own capital of concessionaire is shown in the following table:



**Cash flow** in chart for is as follows:



1. **PROJECT’S FEASIBILITY**

Some of the main criteria to evaluate and to determine the profitability and the feasibility of the project are:

1. Payback period method;
2. Vnet Present Value -NPV;
3. Internal Rate of Return - IRR;
4. Levelised Discount Cost - LDC;
5. Benefit/Cost Ratio.
6. **Payback Period method**

The method of payback period is the easiest method (criteria) to calculate and it expresses the time required to repay the initial investment with the future cash flows.

The pauback period of the investment is about 5 years which is lower than 35 years of the concession term. This is the case when the cash flow is not discounted.



The main disadvantage of the payback period method is that it does not consider the time value of money and the cash flows after the payback period. The following chart represents the payback period for the discounted cash flows. The discounted payback period is 7 years.



1. **Net Present Value - NPV of the Project**

The Net Present Value – NPV of the project represents the difference between the discounted cash flows and the initial investment. It is calculated with the following formula:



CFt - cash flow at time t

I0 - Initial Investment

t - number of years under consideration

i - discount rate

The Net Present Value analyzis the profitability of a project and if the NPV is greater than 0 the project should be accepted because the discounted cash flows cover the initial investment and add value to the investment. It is one of the most reliable measures of the project’s profitability. For the base case disocunt rate of 12%, the Net Present Value of the project is ***1,808,995 EUR***.

1. **Internal Rate of Return – IRR of the Project**

The Intrernal rate of return – IRR is the discount rate for which the sum of the discounted cash flows equals the initial investment, I0. In other words, IRR is the discount rate for which NPV = 0.

The internal Rate of Return is an indicator of the efficiency of the project. GenerEURy the investment is considered profitable if the IRR is higher than the interest rate that can be earned by the same amount of money invested in an alternative investment (for example another project, securities – treasury bills, bonds; money held in a deposit, etc.). The project is considerd acceptable if the internal rate of return is greater than the established minimum acceptable rate of return.

For the project **IRR = 24.06% > 12%** (discount rate or minimum acceptable rate of return).

1. **Levelised Discount Cost - LDC**

Another wellknown method especiEURy in the electricity generation sector is the method of long-term marginal unit cost of electricity generation or Levelised Discount Cost - LDC. This cost is calculated using the following formula:



Ci – represents the sum of the investment cost, operative costs and depreciation costs.

Ei - generated electricity;

ri - discount rate.

For the base case disocunt rate of 12%, LDC = **0.0474 EURcent/kWh**

1. **Benefit/Cost Ratio**

This measure is calculated as a ratio of the present value of cash inflows to the present valu of cash outflows including the inistial investment. This ratio should be greater than 1 in order for the project to be acceptable.

For the discount rate 12% the benefit/cost ratio is B/C = **1. 495 > 1**.

1. **SENSITIVITY ANALYSIS**

The main parameters to be change for the i nvestment are: discount rate, electricity generated, sale price, initial investment, interest rate. In order to have a more reliable feasibility (profitability) analysis it is necessary to perform the sensitivity analysis.The sensitivity analysis will be performed for the financial criteria NPV, IRR, LDC dhe B/C against the above-mentioned parameters.

**Sensitivity Analysis against the discount rate**







**Sensitivity analysis against electricity generated**

One of the main parameters expected to change in the case of hydropower plants projects is annual electricity generation. The following tables show the change of financial criteria when the variation of electricity generation is in the range of ± 30%.



**Sensitivity analysis of NPV Sensitivity analysis of IRR**



**Sensitivity analysis of B/C Sensitivity analysis of LDC**

**Sensitivity analysis against initial investment**

In order to obtain a complete sensitivity analysis of the financial measures against the initial investment, the variation of the initial investment is in the range (70-130)%.



**Sensitivity analysis of NPV Sensitivity analysis of IRR**



**Sensitivity analysis of B/C Sensitivity analysis of LDC**

Also the sensitivity analysis is performed for NPV, IRR and B/C against the variation of the initial investment and the quantity of electricity generated when the dsicount rate is 12%, for the variation of sale price and production and initial investment as well as the variation of the interest rate and debt ratio. The following tables show NPV, IRR, LDC and B/C against the simultaneous change of the initial investment and the quantity of electricity generated, sale price and the quantity of water treated and traded, initial investment and the quantity of electricity generated as well as against the change of interest rate and debt ratio.









































1. **CONCLUSIONS**

Based on the above analysis it results that the project for the construction an operation by concession of the HPPs’ on the Dushar - Zerec stream is a feasible project because:

1. Net Present Value (NPV): ***NPV =*** ***1,808,995 EUR > 0***
2. Internal Rate of Retur (IRR) : ***IRR = 24.06% > 12%***
3. Benefit/Cost Ratio: ***B/C = 1.495***
4. Payback period: ***PBP = 5 years***
5. Discounted Payback period:  ***PBPd = 7 years***

Levelised Discount Cost - LDC: ***LDC = 0.047 Eurocent/kWh***