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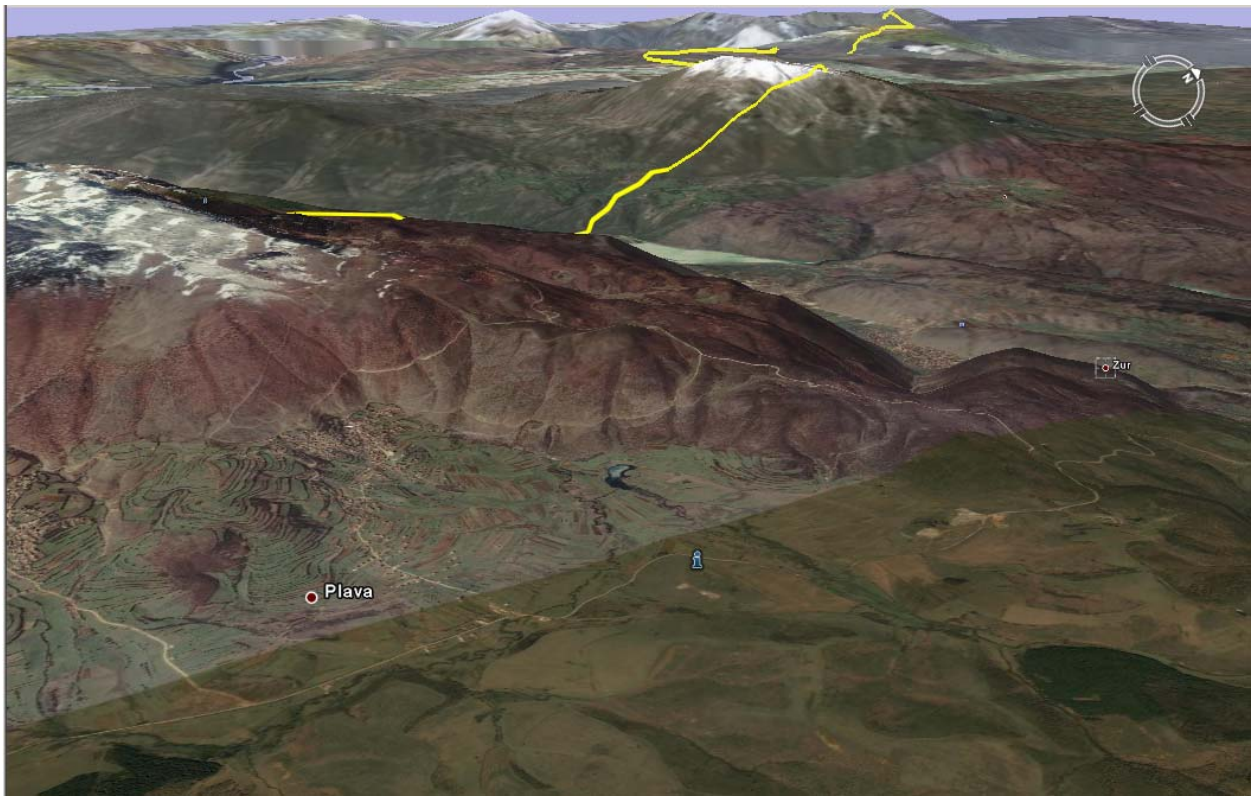
GRANT No H2540

REVIEW OF HPP ZHUR FEASIBILITY STUDY INCLUDING PREPARATION OF PRELIMINARY ENVIRONMENTAL IMPACT ASSESSMENT AND PRELIMINARY SOCIAL ASSESSMENT



FINAL REPORT

GRANT No. H2540

This project is founded by the World Bank

Project implemented by
ELEKTROPROJEKT Consulting Engineers
Alexandera von Humboldta 4, ZAGREB, CROATIA

Zagreb, May 2009

World Bank founded project managed by managed by the
LPTAP Project Office in
Ministry of Energy and Mining of Kosova

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May, 2009

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HPP ZHUR

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FINAL REPORT

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Zagreb, May 2009

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1. INTRODUCTION

Upon closing of the tendering procedure, and based on the GRANT No. H254KOS, LPTAP Project Office, Ministry of Energy and Mining contracted on 13 October 2008 with Elektroprojekt Consulting Engineers, Zagreb, Croatia development of a REVIEW OF HPP ZHUR FEASIBILITY STUDY INCLUDING PREPARATION OF PRELIMINARY EIA AND PRELIMINARY SA.

Based on the previous study, Zhur Hydroelectric Power Plant (HPP) is a system comprising of two hydroelectric power plants of storage-diversion type, HPP Zhur I and HPP Zhur II. The power plant is located NW of the town of Prizren. Available head is harnessed on two water drop structures (steps), i.e. the HPP Zhur I near the village of Zhur and the HPP Zhur II on the Drini e Bardhë . The rivers to be harnessed by this system are those running through the Mt. Sharr massif area, including the Lumi Plavë and Lumi Çaljane rivers with their tributaries. All the stored water is forwarded to the reservoir on the Lumi Plavë and in Fusha e Llopushnikut field. The stored water is conveyed by the pressure tunnel and steel penstock on the HPP Zhur I turbines, using the mean gross head of 565 m. After being used in the HPP Zhur I, the water is run through a gravity tunnel and canal, and by inclined steel penstock to the HPP Zhur II, using the mean gross head of 104.8 m. Ultimately, all the harnessed and used water is discharged into the Drini i Bardhë.

According to the 1983 Feasibility Study Report, 2001 Economy and Financial review the HPP Zhur I installed capacity is 246 MW, and average annual power output 335 GWh. The HPP Zhur II installed capacity is 46.8 MW and average annual power output is 63.2 GWh. This Study does not include the site changes from the period 1986-2001, and Preliminary EIA and Preliminary SA with Resettlement Action Plan.

The key objectives of the contracted activities are to:

- Update the existing Feasibility Study of the HPP Zhur for the development of new HPP Zhur
- Prepare a Preliminary EIA (Environmental Impact Assessment), including transboundary impacts, impacts of downstream irrigation and dam safety associated international requirements
- Prepare a Preliminary Social Assessment including a draft Resettlement Action Plan.

The results to be achieved by the contracted activities include:

Task 1: Review, confirmation and where necessary update of the existing hydrological, hydro-technical, and geological data for the HPP Zhur;

Task 2: Review, optimize and update plant installed capacity - completion of the preliminary engineering design of the HPP Zhur;

Task 3: Review and update / completion of the existing financial and economic analyses, including options for financing;

Task 4: Prepare a preliminary EIA (Environmental Impact Assessment), including transboundary impacts, impact on downstream irrigation and dam safety associated international requirements;

Task 5: Prepare a Preliminary Social Assessment (SA) including draft Resettlement Action Plan.

2. FINDINGS AND CONCLUSIONS

2.1 Task 1: Review, confirmation and where necessary update of the existing hydrological, hydro-technical, and geological data for the HPP Zhur

The following findings and conclusions were made based on the site survey and review of available input data and documentation:

1. The conveyance system route section between the Lumi Çaljane River and the Lumi Plavë River reservoir does not need to be changed due to the area development. This conveyance system could come into conflict with the recently built houses and structures only in a section near Dragash. Based on available inputs and documentation, the proposal is given to modify this conveyance system route section, which is acceptable at the Feasibility Study level but only land surveying results will enable preparation of the final concept.

2. The Fusha e Llopushnikut area suffered considerable changes in space compared to the situation described in design documentation from 1983, when the Brezna Reservoir Conceptual Design was updated, and to the situation as described in the 2001 Feasibility Study revised in economical and financial part. The settlement of Brezna expanded in direction of the Fusha e Llopushnikut planned to be occupied by the reservoir. The site survey also revealed expansion of the settlement of Hani i Llopushnikut, all of which will be impounded.

3. The HPP Zhur I powerhouse site has also suffered significant changes in space compared to the situation described in 1970 Conceptual Design, which was used as the background documentation for preparation of the Feasibility Study. It has earlier been noticed that the HPP Zhur I powerhouse site needs to be relocated. Compared to the 1970 design documentation, it is necessary to change the conveyance system route and surge chamber type, as well as the Zhur I powerhouse elevation.

4. As regards the HPP Zhur I discharge system, i.e. HPP Zhur II conveyance system by a tunnel, no problems ensuing from the area development were pinpointed. In case an open canal is built, its front section will affect recently built houses and a road running towards Vrbnica and border with Albania. Also, its end section near the Dobrushtë-Mirzë village might affect recently built houses.

5. It could be concluded from the available engineering geology data that there are no reasons for relocation of the planned conveyance system route. It could also be concluded from the available data and analyses of the conducted investigations that the Lumi Plavë and the Brezna reservoirs are feasible provided foreseen measures and technical solutions are applied. Preparation of the final designs requires additional investigations and tests: laboratory, geophysics and exploratory boreholes for the planned system structures and facilities.

6. A study titled Analysis of Seismic Hazards and Defining of Design Seismic Parameters for the HPP Zhur System Structures, IZIS, Skopje 1986 offers all necessary data for structural calculation - Seismic analysis. If calculation according to Eurocode 8 is stipulated, the IZIS study will be used with supporting documentation on the basis of which the seismic forces will be calculated according to Eurocode 8.

7. Hydrological documentation and input data from Volume 1 of the Licensing Documentation for construction of the HPP Zhur Project were prepared by Elektroprojekt Consulting Engineers, Zagreb in May 1986. It was concluded, based on the review of the hydrological documentation, that all the analyses had been conducted properly and accurately, and that the results are realistic for the period under consideration. The basic data, however, have often demanded careful checking, and the conclusions had to be made on the basis of data recorded at the remote Orqusha Station set up on the Lumi Plavë. Because of available input data it was not possible to get more reliable hydrological indicators. It is, however, important that they have been determined for the period 1925/26 – 1978/79. During the last thirty years (since 1979), the data availability has been considerably lower. For Orqusha Station, average daily water levels and discharges are available from the Yugoslav Yearbooks for 1983, 1984, 1985 and 1986 only. No observations or measurements have recently been conducted at either Orqusha Station on the Lumi Plavë or at other stations in the catchment. Therefore, no recent basic hydrological inputs are available, so all the conclusions are made on the basis of analyses given in the documentation under consideration. It should be noted that the recent period is somewhat drier than the period covered in the documentation, which might be concluded from the data collected in other catchments. (Average discharge at the Lumi Plavë Orqusha Station for a four-year period (1983-1986) was Q_{sr} = 4.30 m^3/s, which is too short a period for relevant conclusions. Therefore, the results presented in the documentation are considered realistic and acceptable for the analyzed period (125/26-1978/79). Since reliable determination of an impact of the more recent and drier period is not possible due to unavailability of the basic input data, it is recommended that the Lumi Plavë Orqusha Station be reconstructed and hydrological stations set up in points where water intakes are located on the Lumi Çaljane, Lumi Restelic, Lumi Brod, Lumi Leshtani, Lumi Radeshë, Lumi Xërë and Lumi Plavë rivers and that systematic hydrological observations and measurements be urgently initiated. This is a condition to be met if reliable conclusions are to be made on available inflows for the HPP Zhur.

8. The only land surveying documentation available are topographic maps (scale 1:25,000) prepared during the seventies of the 20th century. There is no other land surveying documentation or records of land surveying that might have been carried out during the Conceptual Design preparation. Land surveying of grounds used to build the HPP Zhur system structures is necessary in order to get a picture of the actual condition on the ground and prepare an inventory of structures and areas under construction or planned to be impounded for reservoir creation. Such input data, completed with the data from the

cadastre and land records, is the basis for resolving of property right relations and determination of compensations to the local population.

2.2 Task 2 Review, optimize and update plant installed capacity - completion of the preliminary engineering design of the HPP Zhur

The following project modifications was considered and optimized:

- change in the HPP Zhur I location – the powerhouse site and, consequently, elevation,
- routes of the HPP Zhur I headrace tunnel and penstock, and surge tank type,
- route and elements of the HPP Zhur I discharge system viz. the HPP Zhur II conveyance system,
- number of HPP Zhur II turbine and generator (TG) sets,
- route and size of the conveyance system from the Lumi Çaljane River to the Plavë Reservoir. (Route and size of the conveyance system from the Procke Lubovije to the Rence River (Dragash area) is given in two alternatives. For detail design, a financial optimization for conveyance system needs to be continued.),
- Brezna reservoir ma. water level, and
- Motorway Vrmicë – Merdar (Vrmicë – Prizren section)

Network interconnection analyses shows that:
The price difference between the connection to the 110 kV and 220 kV networks is not significant.

It is expected that the 110 kV alternative would occupy more land area.

Design losses on the power system model are: 22.4 MW in case the HPP Zhur is connected to the 110 kV network, and 20.3 MW in case the HPP Zhur is connected to the 220 kV network therefore they are lower in case the HPP Zhur is connected to the 220 kV network.

Possible connection of the HPP Zhur I to the 110 kV network would be more favourable considering releaving of the transformation load at the 220/110 kV Prizreni 2 Substation (at the present Kosova power system construction level), better maintenance of the voltage profile and reduction in network losses.

The problems related to the 110 kV...400 kV transmission network will be resolved by a Master Plan expected to be drafted in the near future. The document will resolve optimum rated transformation power (since a structural problem of the Kosova Power System is that all major sources are at 220 kV and 400 kV, so the power supply depends on transformations at these voltage levels).

According to the KOSTT expectations, the 220 kV network will not develop further, and a 400 kV ring with transformations of 400/110 kV would be closed. This would resolve the supply of the 110 kV network, so connecting of the HPP Zhur to the 220 kV is justified. This is a logical connection level for a power plant of this capacity, enables its minimum effect on possible shallow connections, and its operation as the peaking plant. Additionally, the design losses on the power system model in the state under consideration are by ~2 MW lower in case of the connection to the 220 kV network.

One Kosovo B TPP unit out of service does not significantly affect the method of the HPP Zhur interconnection.

In request for the HPP Zhur connection in transmission power system of Kosova, according the Energy Regulatory Office and KOSTT rules will have to met:

(1) Rule on general conditions of energy supply (2008)
(2) Grid Code ─ Connection Code (2008)
(3) Transmission Connection Charging Methodology (2008) and
UCTE rules

It is recommended that the characteristics of thy hydro power equipment be defined prior to the project construction, having in mind the Kosova Power System requirements and its parallel operation in the UCTE.**

Basic data and power output for HPP, Zhur I with 2 x 25 m^3/s and Zhur II with 1 x 50 m^3/s for water harnessing at intakes of up to 5-day flows are:

Basic data for water harnessing at intakes of up to 5-day flows		
Catchment area	F= 307.10 km^2	
Mean annual precipitator	h= 958 mm	
Mean annual flow	$Q_{av.ann}$=8.84 m^3/s	
Mean annual inflow volume	$V_{av.ann}$=278.8 hm^3	
Plavë Reservoir • max. water level • total volume • effective storage capacity	 980.40 m a.s.l. $V_{tot.}$= 7.4 hm^2 $V_{e.s.}$= 4.9 hm^2	
Brezna Reservoir • max. water level • total volume • effective storage capacity	 979.40 m a.s.l. $V_{tot.}$= 119 hm^2 $V_{e.s.}$= 112 hm^2	
Gross heads • maximum • minimum	HPP Zhur I 589.40 m 555.25 m	HPP Zhur II 94.15 m 87.94 m
Net heads • maximum • minimum	 583.93 m 533.38 m	 93.52 m 85.41 m
Turbine data • Number • Discharge • Head (working) • Speed • Rated Power	 2 25 m^3/s 557.4 500 rpm 131 MW	 1 50 m^3/s 90.72 300 43 MW
Generator data • Rated Power • Voltage • $Cos\varphi_n$ • Frequency	 2 143 MVA 16 kV ± 5% 0.90 50 Hz	 1 46 MVA 10.5 kV ± 5% 0.90 50 Hz
Transformer data • Rated Power • Transformer ratio • Vector group • Frequency	 2 143 MVA 16/242 kV YNd5 50 Hz	 46 MVA 10.5/242 kV YNd5 50 Hz
Annual electricity production • wet year (1955) • average • dry year (1926)	 586.82 GWh 342.20 GWh 200.86 GWh	 95.00 GWh 55.39 GWh 32.51 GWh
Total electricity production Zhur I+Zhur II • wet year (1955) • average • dry year (1926)	 681.82 GWh 397.59 GWh 233.37 GWh	

Total Investment has been estimated:

	Cost Item	Costs (EUR)
	CONSTRUCTION COST (without VAT)	
1	Civil Works	126,890,000.00
2	Hydromechanical Equipment	33,442,000.00
3	Electromechanical Equipment	76,267,000.00
	INITIAL EXPENSES	
1	Studies and investigation works	7,695,000.00
2	Design and Engineer's supervision	4,217,000.00
3	Field Supervision and Owner's Expenses	8,681,000.00
4	Land Acquisition and housing (with sales tax)	29,824,000.00
	TOTAL INVESTMENT	287,016,000.00

2.3 Task 3: Review and update / completion of the existing financial and economic analyses, including options for financing

The following findings and conclusions were made based on the review and updated documentation:

1. The HPP Zhur is a project built for the high quality electricity production (variabile),
2. Planned HPP Zhur annual output is **397,590,000 kWh.**
3. Tertiary regulation and secondary regulation in the Power system of Kosova,
4. Providing Ancillary Services to power system or in electricity market in region
5. Supporting and increasing of the quality of the existing and New Thermal Power Plant Kosovo units in operation
6. Increasing of the existing Kosova Power System Operating characteristics.

7. The project construction costs are estimated at

	Total [€]
Land acquisition	29,824,000
Civil works	126,890,000
Equipment	109,708,000
Other	20,593,000
Total long-term (capital) assets	**287,017,000**
Current assets	3,110,000
Monitoring	175,000
Interest during construction (7%)	39,030
Total capital and current assets, monitoring	**329,332,000**

8. After the project construction, the equipment replacement will be needed as follows:
   a. Electromechanical equipment, value € 70,070,000, to be replaced in 15th and 50th year,
   b. Hydromechanical equipment, value € 33,442,000, to be replaced in 35th year,
   c. Transmission lines, € 6,196,000, to be replaced in 40th year.

9. The HPP Zhur construction is planned to be completed in 6 years (1 preconstruction and 5 construction years)

10. The project revenues include revenues from electricity sold at 84 €/MWh (mix of: base, variable and emergency import realized in the year 2007) to replace and decrease electricity import) and revenues from CO_2 emission reduction at 10 €/ton. Revenues from CO_2 emission reduction will be earned to maximum 21st year of the project operation. The electricity selling price of 84 €/MWh is based on the price of electricity imported by the Kosova Energy Corporation.

11. Operating expenses are estimated at € 7,061,000 a year.

12. The period analyzed herein includes 50 years of operating lifetime and 6 years of the project construction.

13. Based on the project (investment) cost, revenues from sales, and operating expenses, the project profitability (internal rate of return) is:

Analysis period	Internal rate of return [%]	
	With CO_2 emission reduction revenue	Without CO_2 emission reduction revenue
1st-15th year	3.48	1.52
1st-20th year	5.42	3.72
1st-25th year	5.87	4.27
1st-50th year	7.10	5.99

14. Equity internal rate of return is

Analysis period	Internal rate of return [%]	
	With CO_2 emission reduction revenue	Without CO_2 emission reduction revenue
1st-15th year	-10.13	-
1st-20th year	4.13	-0.14
1st-25th year	5.38	1.70
1st-50th year	7.85	5.84

15. Based on the above, the following could be concluded on the project profitability:
   a. The profitability acceptability criterion is profitability of capital invested in an alternative project (opportunity cost of capital). An alternative risk-free profitability rate is profitability of investment into securities (government bonds). The interest rate on the government bonds is 4 – 6%.
   b. Based on the above, the investment profitability criterion, and revenues earned from CO_2 emission reduction, the project is not acceptable during its first 15 years of operation. In years after the 15th year, the longer its operating lifetime (and number of years in which profit is earned) the more satisfactory is profitability.
   c. When no revenues are earned from CO_2 emission reduction, satisfactory profitability of the project will be achieved in the period of 50 years.
   d. Satisfactory profitability of equity, presuming that the debt/equity ratio is 70% to 30% and the project earns revenues from CO_2 emission reduction, will be achieved in the period of

more than 25 years of operation. Without revenues from CO_2 emission reduction, satisfactory profitability of the project will be achieved in the period of 50 years.

16. Three project construction funding alternatives are analyzed:
    - **a.** Equity financing 100%,
    - **b.** Equity and loan financing at 30% to 70% ratio (interest 7%, repayment period 15 years),
    - **c.** Financing and construction as concession.

17. The economic and financial efficiency of the project in case of 100% equity financing is as follows:
    - **a.** Profitability as in item 11. of the Conclusion
    - **b.** Profit and loss account shows the project will earn the retained earnings after the profit tax for the period between the 1st and 50th year of operation with/without CO_2 emission reduction revenue,
    - **c.** The project is liquid in the period between the 1st and 50th year of operation with/without CO_2 emission reduction revenue,
    - **d.** The project cumulative financial result is tabulated below:

Item		With CO_2 emission reduction revenue [€ 000]	Without CO_2 emission reduction revenue [€ 000]
1.	Revenues (Profit and loss account)	1,781,451	1,669,878
2.	Expenses (Profit and loss account)	695,887	695,887
3.	Profit tax (Profit and loss account)	217,113	194,798
4.	Retained earnings after tax (1-2-3)	868,451	779,193
5.	Depreciation	342,857	342,857
6.	Gross financial result (4+5)	1,211,308	1,122,050
7.	Principal repayment	0	0
8.	Investment 25th – 50th year	179,779	179,779
9.	Net financial result (6-7-8)	1,031,529	942,271

18. The economic and financial efficiency of the project in case of equity and loan financing at 30% to 70% ratio (interest 7%, repayment period 15 years) is as follows:
    - **a.** Profitability as in item 10. of the Conclusion
    - **b.** Profit and loss account shows the project will earn the retained earnings after the profit tax for the period between the 1st and 50th year of operation with/without CO_2 emission reduction revenue,
    - **c.** The project is liquid in the period between the 1st and 50th year of operation with CO_2 emission reduction revenue. In alternative without CO_2 emission reduction revenue, the project is illiquid between the 1st and 15th year of operation (loan repayment period). Illiquidity from the period 1st -15th year can be compensated by a loan to be repaid during the period 16th – 50th year.
    - **d.** The project cumulative financial result is tabulated below

Item		With CO_2 emission reduction revenue [€ 000]	Without CO_2 emission reduction revenue [€ 000]
1.	Revenues (Profit and loss account)	1,781,451	1,669,878
2.	Expenses (Profit and loss account)	891,627	891,627
3.	Profit tax (Profit and loss account)	177,965	155,650
4.	Retained earnings after tax (1-2-3)	711,859	622,601
5.	Depreciation	381,887	381,887
6.	Gross financial result (4+5)	1,093,746	1,004,488
7.	Principal repayment	242,241	242,241
8.	Investment 25th – 50th year	179,779	179,779
9.	Net financial result (6-7-8)	671,726	582,467

e. If the loan financing conditions are: interest 7%, repayment period 15 years, maximum loan share is 77.26% with revenue from CO_2 emission reduction for the project to be liquid in the period 1st-15th year. In alternative without CO_2 emission reduction revenues, maximum loan share under the same conditions is 64.52%.

f. The debt servicing coverage ratio is more than 1 in alternative revenue from CO_2 emission reduction. This fact enables the project to service the annuity of the investment loan.

g. In alternative without revenue from CO_2 emission reduction, debt servicing coverage ration is less than 1, which means that the project does not earn enough money to service the annuity during the period 1st-15th and is illiquid during this period.

h. In the period 1st-50th year, the electricity generation cost for financing at debt/equity ratio 70% to 30% (interest 7%, repayment 15 years) will be between 84.65 €/MWh in the first year of generation and 36.93 €/MWh in the 50th year of generation. The average generation cost during the period 1st-50th year is 51.26 €/MWh. During the loan repayment period (1st-15th year) the generation cost will be 84.65 €/MWh, and after the loan repayment 37.01-36.93 €/MWh. The reason for varying generation cost during the period 1st-50th year is property depreciation.

i. The discounted generation cost, i.e. levelized unit energy costs with revenue earned from CO_2 emission reduction during the period 1st-50th year is

Discount rate (cost of capital) %	Levelized unit energy cost €/MWh
0	41.40
1	44.78
2	49.01
3	54.08
4	59.96
5	66.63
6	74.04
7	82.13
8	90.86
9	100.19
10	110.09

The above table show an average generation cost during the period 1st-50th year, depending on the sources of financing (cost of capital). This analysis does not take into account the structure of the sources of financing, since the distribution of the cost of capital, namely the profit, between the owner of the capital and the creditor is not relevant in this case. For cost estimate, it is not relevant who the owner of the sources of financing is.

j. The sensitivity analysis shows:

- For the revenues and expenses to reach the breakeven point under the conditions when loan financing of 70% is used, annual electricity generation needs to be:
  1. 331,938,715 kWh with CO_2 emission reduction revenue in the period 1st – 15th year
  2. 400,771,463 kWh without CO_2 emission reduction revenue in the period 1st – 15th year
  3. 168.815,382 kWh without CO_2 emission reduction revenue in the period 16st –50th year
- For the revenues and expenses to reach the breakeven point under the conditions when loan financing of 70% is used, minimum selling price needs to be 84.7 €/MWh in the period 1st–15th year, i.e. 37 €/MWh in the period 16st –50th year
- Profitability is sensitive to changes in electricity selling price and to changes in the investment, as shown below:

Item	Profitability – sensitivity analysis Internal rate of return [%] (1st–50th year)	
	With CO_2 emission reduction revenue	Without CO_2 emission reduction revenue
Basic analysis	7.09	5.99
Increase in selling price 5%	7.51	6.42
Increase in selling price 10%	7.91	6.83
Decrease in selling price 5%	6.66	5.54
Decrease in selling price 10%	6.21	5.08
Increase in investment 5%	6.72	5.66
Increase in investment 10%	6.37	5.36
Decrease in investment 5%	7.50	6.34
Decrease in investment 10%	7.94	6.73

19. In case the project is implemented as concession, its economic and financial efficiency from the concessionaire side is:
    - **a.** The concessionaire provides sources of financing
    - **b.** The concessionaire builds and maintains the project, sells the electricity at the price from the concession contract, and transfers the project to the concession grantor after expiry of the concession contract period
    - **c.** The concessionaire pays to the grantor the concession fees of 3% of the revenue earned by the electricity sale
    - **d.** Structure of the economic and financial analysis from the concessionaire side is the same as from the project side, i.e. the Power System of Kosova or electricity selling in open electricity market in region. The difference is in somewhat lower results of the economic and financial efficiency because the concessionaire has the concession fees as a new expense
    - **e.** The project profitability from the concessionaire side is

Generation period	Internal rate of return [%]	
	With CO_2 emission reduction revenue	Without CO_2 emission reduction revenue
1st-15th year	3.15	1.14
1st-20th year	5.13	3.39
1st-25th year	5.57	3.93
1st-50th year	6.84	5.72

    - **f.** Even if the project is implemented as concession, the concessionaire is expected to use the model of financing with debt/equity ratio 70% to 30% (interest 7%, repayment 15 years). Under such financing conditions, the concessionaire equity profitability is:

Generation period	Internal rate of return [%]	
	With CO_2 emission reduction revenue	Without CO_2 emission reduction revenue
1st-15th year	-	-
1st-20th year	3.37	-0.98
1st-25th year	4.65	0.87
1st-50th year	7.37	5.39

    - **g.** The profit and loss account shows the retained earnings after tax in all analyzed plant operation years in the period 1st-50th year, with/without CO_2 emission reduction revenue.
    - **h.** Cumulative financial result of the concessionaire is:

Item		With CO_2 emission reduction revenue [€ 000]	Without CO_2 emission reduction revenue [€ 000]
1.	Revenues (Profit and loss account)	1,781,451	1,669,878
2.	Expenses (Profit and loss account)	941,724	941,724
3.	Profit tax (Profit and loss account)	167,945	145,631
4.	Retained earnings after tax (1-2-3)	671,782	582,523
5.	Depreciation	381,887	381,887
6.	Gross financial result (4+5)	1,053,669	964,410
7.	Principal repayment	242,241	242,241
8.	Investment 25^{th} – 50^{th} year	179,779	179,779
9.	Net financial result (6-7-8)	631,649	542,390

i. If the project is financed at debt/equity ratio of 70% to 30% (interest 7%, repayment 15 years), the project will not be liquid during the period 13^{th}-15^{th} year with revenues from CO_2 emission reduction. Cumulatively, the project is liquid during the period 1^{st}-15^{th} year. Without revenues from the CO_2 emission reduction, the project is illiquid during the loan repayment period (the first 15 years of operational lifetime).

j. In order for the project to be liquid during the loan repayment period, with revenues from CO_2 emission reduction, maximum loan financing share would be 74.95%. Without revenues from CO_2 emission reduction, maximum loan financing share would be 62.21%.

k. The debt servicing coverage ratio in alternative with revenues from CO_2 emission reduction would be less than 1 during the period 13^{th}-15^{th} year, and in these years the project is not liquid. The debt servicing coverage ratio in alternative without revenues from CO_2 emission reduction would be less than 1 during all the loan repayment years, and in these years the project is not liquid.

l. The electricity generation cost in case the project is build as concession and financing is based on the debt/equity ratio 70% to 30% is
  - **i.** 87.17 €/MWh during the period 1^{st}-15^{th} year of operation
  - **ii.** 39.53 €/MWh to 39.45 €/MWh during the period 16^{th}-50^{th} year
  - **iii.** 53.78 €/MWh on average during the period 1^{st}-50^{th} year

m. The levelized unit energy costs during the period 1^{st}-50^{th} year, with revenues from CO_2 emission reduction is:

Discount rate (cost of capital) %	Levelized unit energy cost €/MWh
0	43.92
1	47.30
2	51.53
3	56.60
4	62.48
5	69.15
6	76.56
7	84.65
8	93.38
9	102.71
10	112.61

n. The sensitivity analysis on the concessionaire side shows:

- For the revenues and expenses to reach the breakeven point under the envisaged financing conditions:
  - **1.** 340,644,894 kWh a year with CO_2 emission reduction revenue in the period 1^{st} – 15^{th} year

4. 413,532,144 kWh a year without CO_2 emission reduction revenue in the period 1st – 15th year
5. 174,190,513 kWh a year in the period 16st –50th year

- For the revenues and expenses to reach the breakeven point, the minimum selling price is:
  2. 87.2 €/MWh in the period 1st – 15th year
  3. 39.5 €/MWh in the period 16st –50th year

- The profitability (internal rate of return) changes depending on the electricity selling price and the project construction costs as follows:

Item	Profitability – sensitivity analysis Internal rate of return [%] (1st–50th year)	
	With CO_2 emission reduction revenue	Without CO_2 emission reduction revenue
Basic analysis	6.84	5.72
Increase in selling price 5%	7.25	6.15
Increase in selling price 10%	7.65	6.56
Decrease in selling price 5%	6.41	5.28
Decrease in selling price 10%	5.97	4.82
Increase in investment 5%	6.47	5.40
Increase in investment 10%	6.13	5.11
Decrease in investment 5%	7.24	6.07
Decrease in investment 10%	7.67	6.45

20. As regards economic efficiency with regard to the social benefits, the revenues include both direct and indirect benefits, and expenses exclude payment of different taxes, as shown below:

Discount rate [%]	Ratio between discounted revenue and cost
6	1.30
7	1.18
8	1.07
9	0.98
10	0.89

Based on the above, the project has the following economic and financial characteristics:

It is presumed, based on the mix (base, variable and emergency) imported electricity price realized for year 2007, that the HPP Zhur will sell electricity as tertiary regulation energy to the Kosova Energy Corporation or in the free market at price of 84 €/MWh. With that price, the project profitability is:

Generation period	Internal rate of return for selling price of 84 €/MWh [%]			
	For concession grantor (Kosova Energy Corporation)		For concessionaire	
	With CO_2 emission reduction revenue	Without CO_2 emission reduction revenue	With CO_2 emission reduction revenue	Without CO_2 emission reduction revenue
1st-15th year	3.48	1.52	3.15	1.14
1st-20th year	5.42	3.72	5.13	3.39
1st-25th year	5.87	4.27	5.57	3.93
1st-50th year	7.10	5.99	6.84	5.72

The owner of the source of financing (capital) decides on acceptability of the profitability. The profitability acceptability is decided after having considered possible investment alternatives (opportunity cost of capital). Since the risk-free profitability of investment is at 5% (government bond interest), and if 2% is added for the project-related risks, the required profitability is 7%. The profitability over 7 % is achieved by the project during the period of 50 years on the Kosova Energy Corporation side, with CO_2 emission reduction revenue.

To achieve the project profitability on the concessionaire side of 7% during the period of 50 years, including the revenue from CO_2 emission reduction the electricity selling price would be 84.65 €/MWh.

Since, considering energy aspects, it is necessary for the HPP Zhur to be market risk free, there is only a risk that the electricity generation will depend on the water availability. For that reason, the owner of the capital might lower the marginal profitability below 7%. If the marginal profitability is 5%, the electricity selling price with revenues from CO_2 emission reduction should be 69.15 €/MWh from the concessionaire side, namely 66.63 €/MWh from the Kosova Energy Corporation (concession grantor) side.

The period of 50 years is a comparatively long period on which the investor would base its decision. Therefore, presuming the owner of the capital expects the investment payback within 25 years, the selling price for the profitability of 5% would be 78.74 €/MWh from the Kosova Energy Corporation side, namely 81:26 €/MWh from the concessionaire side.

Relation between the profitability and the electricity welling side is tabulated below:

Profit [%] (Discount rate [%])	Levelized unit energy cost [€/MWh]			
	For concession grantor (Kosova Energy Corporation)		For concessionaire	
	1^{st}-25^{th} year	1^{st}-50^{th} year	1^{st}-25^{th} year	1^{st}-50^{th} year
0	54.10	41.40	56.53	43.92
5	78.74	66.63	81.26	69.15
7	92.71	82.13	95.23	84.65
10	118.08	110.09	120.60	112.61

Since the profitability is very sensitive to the electricity selling price level and period in which the profitability is achieved, this is the fact to be taken into consideration in the concession contract so that the concession duration is between 20 and 30 years, which will enable the concessionaire to recover its invested capital.
The Law on the Energy Regulator No. 2004/9 (Official Gazette of the Provisional Institutions of the Self-Government in Kosovo 22/2008) specifies that activities in the energy sector could only be carried out by the operators licensed by the Energy Regulator. The license validity differs for different energy sector activities. For facilities generating electricity, license is issued to maximum 30 years with a possibility of renewal.. It would be useful if the concession contract period would be determined in relation with the license validity.

2.4 Task 4: Prepare a preliminary EIA (Environmental Impact Assessment), including transboundary impacts, impact on downstream irrigation and dam safety associated international requirements

2.4.1 Legislative and Regulatory Overview

The Kosova legislation in the field of environment and nature protection is not fully aligned with the EU legislation. The major gaps in environmental legislation of Kosova arise from:

- non-existence of physical plans,

- partial harmonization of legislation with EU directives,
- absence of the environmental strategy,
- absence of a state of the environment monitoring strategy,
- absence of a biodiversity strategy,
- absence of basic environmental impacts plans (soil, water and air), and
- shortage of institutions and vaguely defined responsibilities of institutions according to the law.

As a rule, involuntary resettlement is conducted according to the World Bank Involuntary Resettlement, Operation Manual Bank Policies (OP 4.12) and the IFC Performance Standard 5.

2.4.2 Overview of Possible Impacts

The HPP Zhur project feasibility assessment is mostly based on the cost-benefit ratio resulting from the planned project construction.

The project feasibility assessment shall include the HPP Zhur construction feasibility evaluation from the point of view of both environmental impact favorability and project feasibility through the so called “cost-benefit” analysis.

Area under Direct and Indirect Impacts

The direct impact area is the area directly occupied by the structure.

The construction of the planned project shall result in the area of 560.1 ha under the direct impact, namely the Plavë Reservoir with approx. 49 ha, the Brezna Reservoir with about 500 ha, the conveyance system from the Brezna Reservoir to the HPP Zhur I with the powerhouse 3.3 ha, and conveyance system between the HPP Zhur I and Zhur II together with the HPP Zhur II powerhouse with 4.0 ha. The canals within the Lumi Brod River conveyance system during the construction shall occupy about 11.4 ha. Upon the construction, about 7.6 ha of these areas shall be restored, since the canals are to be covered. About 3.8 ha shall be permanently lost due to road construction next to the covered canals. Meadows and pastures cover about 432 ha, plough land about 80 ha, forests about 2 ha, arid and building development land about 30 ha, and developed building land about 17 ha.

Within the Brezna Reservoir boundaries there are about 200 family houses with farm buildings (stables) which also need to be demolished. The buildings are located in the village of Brezna and Llopushnikut. Among other structures to be demolished in the village of Brezna is a school and a playground. Three cemeteries have to be moved in the same village.

Within the future Plavë Reservoir boundaries, including a 50 m water surface belt at maximum water level, 25 residential family houses with farm buildings (stables) are situated, which need to be demolished.

Among the structures to be demolished for the purposes of the Brezna Reservoir is a school and health centre in the village of Llopushnikut. Catering facilities and small scale industries to be demolished in the village of Brezna for the purposes of obtaining required space for the Brezna Reservoir shall yet have to be established in the following phases of the HPP Zhur project.

For the Brezna Reservoir construction, three cemeteries will be impounded, along with about 3 km of state road Prizren – Dragash/Sharr and about 3 km of local road

Llopushnik – Brezna. The cemeteries and roads to be impounded, and other infrastructure to be relocated, such as the water supply and power supply systems.

The indirect impact area is the undeveloped area on which the environmental impact of the project may be defined on the basis of preset criteria and standards. Indirect impacts may occur through non-application of additional technical or other protective measures.

The area under impact depends on technical designs which shall create the desired or allowable impact level. Criteria and standards are to be defined by competent bodies and state government institutions, sometimes as proposed by the designer and developer, and at the request of both the land user of the area under construction, and the land user of the area under the environmental impact of the structure.

Benefits from the Planned Project

The following benefits shall be derived from the HPP Zhur construction:

- annual power output of approx. 400 GWh produced by renewable inexhaustible resource (water), which does not contaminate abiotic components such as: air, soil and water, has no hazardous effects to human health, and which would consequently improve the annual electricity balance in Kosova,
- successful coverage of the variable part of the daily diagram (peaking),
- guaranteed supplies should energy be exported,
- provide the ancillary services to power system
- provide the tertiary and secondary reserve
- sale of the electricity surplus produced at night, thus providing extra energy from the HPP Zhur at times of maximum consumption, and ensuring continual sale of electricity along with major financial effects, or increase in value of less valuable energy produced in thermal power plants,
- ensuring cold standby with minimum water loss (as necessary) and hot reserves for thermal power plant capacities,
- environmental quality assurance and control in the HPP Zhur system catchment,
- opening new jobs; requirements for employment shall occur during construction and upon the construction of the planned hydroelectric power plant,
- improvement in conditions for day-trip tourism development,
- improvement in conditions for sports and recreation at the reservoir and in the hinterland,
- improvement in conditions for weekend resort development,
- improvement in conditions for development of angling,
- improvement in hunting conditions,
- possibilities for cage fish farming in the reservoirs.

Benefits from the planned project are derived from fulfillment of all land and natural resource user objectives. Even though the most favorable design has been selected, certain direct and indirect unfavorable environmental impacts still cannot be avoided.

Therefore, all project environmental impacts during construction, operation and shut-down have been reviewed in the study, so as to be able to assess values of major project impacts on the present state of the environment. The assessment of such impacts shall be used in the cost-benefit analysis for the purposes of verification of the total social feasibility of the project construction.

IMPACTS DURING PROJECT CONSTRUCTION

The construction of the planned project shall last for approximately 5 years, and no impacts are expected on the climate, groundwater, geology, seismic, protected cultural and natural assets, landfill, telecommunication system and business sector.

The following possible impacts impacts could be expected during construction which are of limited duration:

- **Noise.** Noise emission is undesirable noise generated by machinery and vehicles, particularly when construction work and transportation are carried out during the night. The required noise level at the residential zone boundaries is 45 dB(A). The highest on-site noise source is machinery and equipment used for tunnel driving (80 dB(A)) and it could have the greatest impact on the population living in the nearest houses in the Dragash/Sharr village.
- **Atmospheric pollution** by dust and exhaust gases generated by operating machinery used in construction of the planned system and access roads, in the immediate vicinity of the construction site and during delivery and/or removal of material. This impact will mostly effect the settlements closest to the site.
- **Soil contamination** due to inadequate disposal of material and fuel and lubricant leaking from the machinery and vehicles.
- **Water contamination,** particularly contamination of surface water during the works carried out on the Plavë Reservoir and Lumi Brod conveyance system construction caused by fuel and lubricant leaking from the machinery used for earth works and vehicles. The surface water contamination could also be caused by scouring of backfill and scattered material on the construction site surface.
- **Terrestrial fauna.** Impact to which the terrestrial fauna will be exposed includes temporary migration of some animal species, including hunting game, from the habitats at the construction site and in its vicinity caused by the works, atmospheric pollution and noise. The impacts will increase considerably if the works are scheduled during the reproductive period for individual animal species and groups.
- **Agriculture.** Impact on crops includes decrease in value of crops caused by dust emission and suspended particles at the plots in the vicinity of the construction site.
- **Road traffic.** The local roads might be damaged due to increase in heavy vehicles transportation volume increase during the project construction.
- **Water supply problems.** Problems with water supply might occur during the ground preparation for impoundment of the planned reservoir and modifications on the existing pipelines at the reservoir sites.
- **Energy**
  - ***Power transmission.*** Problems with power supply might occur during relocation of the transmission line at the Brezna Reservoir site.
  - ***Power distribution.*** Problems with power distribution will only occur in the local distribution network segment connected to the houses in the Brezna and Zym settlements planned for demolition because of impoundment of the reservoirs.
- **Landscape.** The landscape impact includes changes in the landscape, primarily due to removal of the vegetation cover and the construction site appearance.

Impacts which are not of limited duration include:

- **Habitats.** Impact on habitats includes gradual loss of animal and plant habitats in the area occupied by the structures of the planned HPP Zhur structures, i.e. about 560 ha of land, but loss of these habitats shall not cause extinction of any animal or plant species.

- **Residential and business buildings.** Since the planned project occupies the parts of village areas, its construction would demand demolition of some 225 residential and business units, 25 in Zym and about 200 in Brezna.
- **Agricultural land** (arable land, meadows and pastures). Impact on agricultural land includes gradual loss of about 523 ha of agricultural land, of which about 89 ha belongs to highly productive arable land, about 70 ha at the Brezna Reservoir site, about 11 ha at the Plavë Reservoir site and about 8 ha at the area planned for the canal network installation (Section 4, item 4.1.2.17).
- **Forests and forest land.** Impact on forests and forest land includes gradual loss of about 2 ha of forests and forest land in the Plavë Reservoir site area.
- **Building land.** Impact of the building development land includes gradual loss of about 17 ha of building land, of which some 15 ha in the Brezna Reservoir site area.
- **Other land.** Impact of the building development land includes gradual loss of about 8 ha of other land.
- **Impact on allocation and land use.** Already during construction works, certain land parts shall permanently lose their initial allocation and use, particularly the commercial forests at the area of about 2 ha, agricultural land at an area of about 523 ha and building land at an area of about 17 ha.
- **Cross-impact with other planned facilities.** According to available data, the planned project shall have a cross-impact with the following structures:

    - Dam and reservoir at the Lumi Plavë river with planned small hydroelectric power plants to be built at the Lumi Plavë River on the territory of Kosova,
    - Dam and reservoir on the Lumi Plavë River with the planned HPP Lumi Plavë in Albania.

Possible favorable effects of the project construction include:

- **New jobs.** Construction of a large system such as the HPP Zhur project mobilizes large workforce, which means increase in employment during the project implementation. Increase in employment rates will primarily be felt in the municipalities accommodating the project.
- **Illegal dump sites.** Remediation of illegal dump sites is one of possible benefits to be gained from the project implementation in the project catchment and immediate vicinity of the project site.
- **Landscape.** Possible favorable effect on the landscape includes landscaping design and its implementation of a part of the area and revival of some habitats.

IMPACTS DURING HYDROELECTRIC POWER PLANT OPERATION

Possible impacts expected during the project operation, in addition to the permanent habitat loss at about 560 ha, include:

- **Climate change.** Possible impact on climate change, in the Brezna Reservoir only, includes deviations in current temperature values for about 0.5 to 2^{o}C, increase in wind speed between 10 and 30%, and increase in air humidity between 10 and 20 % compared to the present state.
- **Surface water.** Expected impacts during the project operation include change in the water flow hydrological regime in the streams downstream from the dam, i.e. intake structure. It is uncertain whether the envisaged biological minimum for the environmentally acceptable flow is sufficient to ensure development and

preservation of indigenous communities from the streams after all necessary quantities of water have been harnessed. This is an issue to be agreed upon with the Republic of Albania.

- **Agricultural land.** Impact on agricultural land includes permanent loss of about 523 ha of agricultural land, of which about 89 ha belongs to highly productive arable land (about 81 ha at the reservoir sites and about 8 ha at the area planned for the canal network installation. The impact on the agricultural production could also be expected in the area downstream from the water intake, by the streams, that have been irrigated.
- **Forests and forest land.** Impact on forests and forest land includes permanent loss of about 2 ha of forests and forest land in the Plavë Reservoir site area.
- **Building land.** Impact of the building development land includes permanent loss of about 17 ha of building land, of which some 15 ha in the Brezna Reservoir site area.
- **Other land.** Impact of the building development land includes permanent loss of about 8 ha of other land.
- **Habitats, flora and fauna.** Construction of the planned project will cause extinction of plant communities in the project catchment and animal species habitats at the area of about 560 ha which belong, according to the Corine Biotopes Classification to the category 2 waters, 3 underwoods and meadows, 4 forests, 5 agricultural regions, 86.2 villages and 87.2 mine communities.
- **Fish fauna.** The greatest and most obvious impact of the dam construction on the streams will be prevention of fish migrations, which will particularly affect the fish that migrate seasonally for reproduction and feeding. it is a known fact that migratory species massively gather downstream from the dam trying to pass upstream. In such circumstances, they are much more threatened by predators than in natural circumstances. During downstream migrations, there is a direct negative impact on fish in terms of the fish kill because of their falling over the spillways. Decrease in the sediment downstream from the dam causes decrease in the fist food quantity.
- **Hunting.** By completion of the planned HPP Zhur and putting it into operation, the area of the hunting grounds will be considerably reduced and environment of the lowest parts of hunting grounds shall be changed to a certain point. The impact to be suffered by the game, particularly during the initial period of the system operation, will include possible drowning of game. However, these impacts are such that all the game will be able to adapt, so they might be considered as minor.
- **Impact on allocation and land use.** Construction of the planned project will result in change of use on approximately 560 ha of land.
- **Sociological and demographic aspect.** Due to HPP Zhur system construction, and in conformity with the available design documents, about 225 residential buildings shall be flooded, namely about 200 in the Brezna village and about 25 in the Qollopek (Zym) village. An elementary school and the playground will be demolished, and cemeteries relocated in the Brezna village. An elementary school and a health centre shall be flooded in Llopushnik village. Apart from the residential buildings in the Brezna Reservoir area, several small business structures shall also be flooded, the precise number of which is yet to be established. Due to planned project construction in the Plavë Reservoir area, the use of about 11 ha of agricultural land shall be lost, as well as about 34 ha of meadows and pastures and of about 2 ha of forests, the ownership of which still needs to be established. In the Brezna Reservoir area production shall cease on about 70 ha of arable land and the use of pastures and meadows on about 400 ha.
- **Landscape.** By impoundment of the Plavë Reservoir, water level will reach approximately 34 m, and the water discharge into the Fusha e Llopushnikut field shall have a major impact on the original habitat, and consequently on loss of

plant and animal species on the construction area. The project construction will change certain natural and cultural characteristics and assets of a landscape. Indigenous vegetation of meadows and pastures, as well as groves or lesser parts of forests shall be lost at the Plavë Reservoir area. Visually, the water surface mass of uniform rhythm shall dominate and thus reflect on the visual quality in relation to the current landscape units.

Possible favorable effects during the project operation include:

- more order within the planned project area.

- **Agricultural production.** It will be possible to ensure sufficient quantities of water for irrigation of the agricultural land in reservoir valleys. The illegal dump sites will be remediated, which is another favorable effect for the agriculture. This is not only the matter of "esthetic aspect" or the landscape impact. This is rather a realistic water contamination risk, and an issue of endangered plants in the vicinity, and direct or indirect import of contamination into the food chain.
- **Fish fauna.** Construction of the Plavë (to 49 ha) and Brezna (to 500 ha) reservoirs will result in increase in ichthyoproductivity as compared to the parent watercourse, which is a requirement for increased interest in angling. Reservoirs also offer possibilities of cage fish farming. Due to expected temperature differences, the reservoirs would be appropriate for cage fish farming of quality food fishes, such as salmonidae.
- **Forestry.** The increase in air humidity and increase in precipitation volume in the reservoir area shall have a favorable impact on increase in forest biomass production. However, due to smaller reach of climate changes from the reservoir borders (several tens of meters upwards and 1 to 2 km from the banks), such favorable impact shall affect only smaller forest areas.
- **Hunting.** Even though existing hunting ground surface reduction may be unfavorable considering current situation in hunting, forming of new water surfaces shall have a favorable impact on development of waterfowl, and thus increase hunting possibilities in the area. The effect will also be favorable on high game because of improved watering conditions.
- **Impact on Allocation and Land Use.** After construction, new use of land may also include tourist and recreational uses. Reservoir water surfaces of about 550 ha may serve for recreation to community. Promenades and bicycle trails may be formed near the reservoirs, while in their hinterland other sporting recreational and educational programs. Reservoirs may also be used for cage fish farming.
- **Sociological and demographic aspect.** Provided the protection measures are taken, the planned project shall not threaten the life and working conditions of the local population, it shall not encourage emigration, stop immigration, jeopardize business orientation of the population or contaminate natural resources important for the living and working in the area, but rather encourage immigration and employment in the area.

Positive effects as a result of the planned construction include:

- higher property value,
- better sporting and recreation conditions,
- new sources of income due to development of new activities, tourism in particular,
- landscaping of the wider area, construction of infrastructure and roads.

IMPACTS IN CASE OF EMERGENCY AND RISK ASSESSMENT

Although all the HPP Zhur structures shall be designed and constructed in conformity with the existing regulations, accidents caused by force majeure still may occur during the operation of the HPP Zhur system. Force majeure implies devastating earthquakes of magnitude exceeding the design magnitude, wars, intentional damages to structure parts, or installations.

For impact assessment and definition of the protection measures, the Plavë Reservoir dam demolition emergency plan will be prepared defining the consequences due to demolition and protection measures in the affected area.

Based on the obtained results, a flooding zone delineation plan shall be elaborated, along with the warning and alert system.

IMPACTS AFTER SHUT-DOWN

The HPP Zhur is planned to be a permanent structure.

2.4.3 Compliance of the Project with the International Liabilities of the Republic of Kosova on Reduction of Transboundary Environmental Impacts and/or Reduction Global Environment Impacts

In line with the Espoo Convention, the competent ministry of the Republic of Kosova notified the competent ministry of the Republic of Albania about the planned HPP Zhur Project.
During the current project implementation stage, a contact has been established between the relevant authorities of the Republic of Kosova and the Republic of Albania regarding the transboundary issues. This cooperation is ongoing.
Since the said water quantities defined as "biological minimum" have not been agreed on with Albania, it needs to be done in the future stages of the HPP Zhur Project development. This is a very important point before final design for determination of the final input hydrological parameters on which the rated discharge of the planned project depends.

2.4.4 Environmental Protection Measures

GENERAL

The preliminary Environmental Impact Assessment study of the planned HPP Zhur project in question is based on existing documents which do not suffice for a final assessment of impacts. For that reason, the proposed general environmental protection measures of the planned project include also documents to be provided prior to the preparation of the Environmental Impact Assessment study of the HPP Zhur and those to be provided prior to the future project development stages.

Prior to the development of the Environmental Impact Assessment study for the HPP Zhur project, the following documentation needs to be prepared:

- the Physical Plan for the Republic of Kosova and municipalities of Prizren and Dragash/Sharr

- a study of the presence of caves and cave fauna, especially in the part of the respective area in which the construction of headrace and tailrace tunnels is planned;
- a vegetation map of the area observed,
- a study of the presence of the invertebrate fauna, especially the butterfly fauna, and the terrestrial vertebrates, including the endemic, protected and threatened plant and animal species
- a study of the actual status of agricultural production,
- a study of the actual status of forestry,
- a study of fish stocks status,
- a study of hunting status,
- a conservation study,
- the environmentally acceptable flows downstream from the dam and the intake structure, in agreement with the Albanian requirements
- study on status of houses and other structures in the settlements in and near the project catchment,
- study on the condition of the discharge system, i.e. septic tanks used in settlements in and near the project catchment,
- study on the water supply, power and telecommunication networks in and near the project catchment,
- study on the status of illegal dump sites in the project catchment,
- study on equitable compensation or replacement for the facilities and the space occupied;

Prior to the development of the Environmental Impact Assessment study it is also necessary to have:

- stream hydrological data
- surface water quality data
- basic meteorological data (precipitation, air humidity, fog, wind).

In the following project stages, the developer needs to:

- prepare a cemetery relocation design, taking into consideration the requirements of prelates;
- develop a model of impacts of the planned reservoirs on climate change;
- prepare a construction site organization design;
- prepare a blasting design;
- prepare a landscaping design;
- in collaboration with the competent local authorities, define borrow area locations for material needed for the construction of the Plavë Reservoir dam;
- ensure delivery of artificial material to the construction site from warehouses or plants that must be situated outside the construction area;
- in collaboration with the competent local authorities, define locations for the disposal of surplus material excavated but unused, with the humus cover to be tipped at specially determined locations;
- inform the public through mass media about the execution of the planned project and expected impacts;
- provide accommodation for the staff recruited for the construction of the system and ensure locations for solid waste collection;
- ensure disposal of waste coming from toilet facilities (if chemical) and solid waste by licensed companies;
- provide an adequate location for storing the machinery and construction equipment and for the equipment and machinery maintenance;
- mark the construction site and provide adequate on-site protection;
- inform the conservation authority about the commencement of works for the purpose of supervision during construction;

- ensure cooperation with a biology expert for protection of habitats, flora and fauna;
- provide reproduction material needed for stocking the streams and reservoirs with fish from the nearest existing hatchery or by constructing a new one;
- in collaboration with the competent local authorities, define locations for the disposal of material collected when cleaning reservoirs, and estimate the possibility of its commercial use;
- in addition to the environmental monitoring design, prepare the project technical monitoring design.

The project developer shall be obliged to implement the environmental protection measures pursuant to the Ruling that the project is environmentally sound made by the competent ministry of the Republic of Kosova.

PROTECTION MEASURES DURING PROJECT EXECUTION

The project developer shall ensure that the contractor uses adequate machinery and respects the project construction schedule, respects the approved design documentation and abides by the laws and regulations.
The essential measure underlying the implementation of environmental protection during project execution is an integrated control over environmental protection throughout the entire construction site. Environmental control should include experts specialized in various fields, such as a conservator, an ecologist, a forester, an agronomist, etc.

Protection against dust and noise

The basic measure for the protection against dust is to water areas where the works are carried out, while the protection against noise may be ensured by using machinery which is technically in order. To minimize noise and dust, the speed of vehicles should not exceed 30 km/h.

Protection against water contamination

During the execution of the planned project, mobile toilet facilities containing watertight tanks are to be provided. These toilet facilities are to be emptied and the contents disposed of in a safe manner.
The storage of fuel, lubricants and equipment on the site is to be minimized. Any release of fuel, lubricants or other liquid agents into the soil and water on the site is strictly prohibited and such cases are to be immediately remedied.

Waste materials generated during construction are to be deposited at a specially determined location and wastes are to be regularly transported from the construction site to the nearest engineered landfill or a temporary landfill in case of inert construction waste

A part of the watercourse downstream from the dam or water intake structure is to be trained taking into account the biological engineering methods of watercourse training.

As regards newly formed aquatic ecosystems, all grass vegetation and underbrush are to be removed before impoundment of the reservoirs in order to slow down the eutrophication. Forest trees and individual trees are to be cut low, but stumps need not be grubbed.

Measures for the protection of flora and fauna

An essential measure for prevention of unnecessary degradation of habitats is to confine the works within the narrow project site and plan them outside the reproduction period of specific animal groups

Soil protection measures

A 0.3 m thick plough top soil is to be removed selectively and in a controlled manner, and temporarily deposited at a specially determined location. The earth material deposits are to be finally shaped in line with the existing topography and integrated into the environment in the best way possible.

The earthworks are to be organized taking into consideration the weather conditions. In case of heavy rains and winds the works must be suspended, the location protected against flooding and the material against being washed out or scattered. Upon completion of each work phase, earth parts of the structures must be protected against erosion.

Upon completion of works the environment of the dam, access roads and the conveyance and the discharge system must be returned to the original state.

Hunting protection measures

For the purpose of the wildlife protection during execution of works, it is necessary to arrange the reservoir banks in the manner that enables the wildlife to come safely out of the water. Towards this end it is allowed to use porous concrete elements which facilitate the growth of specific vegetation**.**

Fishery protection

The survival of the fish community during execution of works requires the maintenance of an adequate water quality of streams.

Agricultural protection measures

During execution of works the local population must be allowed to use pastures, meadows and arable land in the area inside the project boundaries. Surplus material and wastes shall not be deposited on the surrounding ground.

Forest protection measures

During execution of works it is not allowed to cut and damage trees and the root system of the trees outside the project site. Any deposition of surplus material and waste, and release of waste oil in forests and in the forest ground is prohibited.

Measures for the protection of natural and cultural assets

Prior to excavation of the humus and surface layer of earth in locations of individual facilities, the site must be visited by the staff of the art-conservation institute and the institute for nature protection that will lay down the conditions of excavation works and conditions of possible further control.

Measures for the protection of facilities and infrastructure

All works on the facilities and infrastructure must be carried out in the manner that will not endanger their functions.

Landscape protection measures

Upon completion of all works, all construction site structures and other construction site elements are to be removed and a full technical and biological rehabilitation of the degraded space surrounding the project is to be carried out in accordance with the landscaping design.

Measures for the protection of humans

It is required to implement permanent measures for the prevention of the spread of dust and mud to the environment and to mitigate noise effects. Vehicles and construction machinery must be provided access from the construction site roads to local roads without any disruption of local traffic.

PROTECTION MEASURES DURING PROJECT OPERATION

Water protection measures

Wastewater is to be collected in watertight tanks and periodically transported to the permitted point of discharge. Oil separators must be properly maintained. No discharge of oil and other chemicals into the soil and streams is permitted. Besides, it is necessary to monitor the movement of leachate originating from the sanitary landfill located in the vicinity of the Brezna Reservoir and to envisage accordingly adequate measures to prevent such waters from entering the reservoir.

In order to minimize the filling up of the Plavë Reservoir, particularly endangered sections of the highland part of the catchment area need to be additionally greened and afforested. The reservoir bottom deposits must be cleaned at specified intervals.

In the stream bed itself and along the stream banks only the controlled growth of trees and bushes is to be allowed (for the protection against stream jams and flooding).

Protection of habitats, plant and animal life

Regular maintenance and care for flora and vegetation are envisaged in order to protect flora and fauna of terrestrial ecosystems during the project use.

To improve the landscape appearance, all areas in the hinterland of the planned project need to be left to the natural succession of communities and all open areas at the location of the planned project are to be planted with indigenous vegetation of the area according to the approved horticultural design.

Permanent monitoring of indicator species will enable carrying out of additional measures for protection of endangered species and communities.

Protection of hunting

The hunting unit leaseholders must prepare a special plan for the protection of game in this area and adjust the calendar of their activities to the planned use of the project and to its environment.

Protection of fishery

Since the newly created aquatic ecosystems will be used by the anglers, it is necessary to increase the fish stock. However, it is important to ensure that stocking with fish is neither unorganized nor unplanned, but carried out in cooperation both with fishery experts and the environmental protection specialists.

A necessary measure is to prevent access of fish to intake structures of powerhouses (repelling by light, sound or electricity) so as to avoid any fish kill during downstream migrations.

Protection of forests

It is necessary to monitor periodically the peripheral parts of forest areas so as to identify possible effects of reservoir waters on the health and quality of tress in the hinterland of the planned reservoirs.

Protection of agricultural land

Since the protection of soil and the protection of waters represent a permanent task of all direct and indirect users of the space, and considering the fact that agriculture is a major potential water polluter, careful use of fertilizers and agrichemicals is recommended in order to reduce pollutant emissions from agriculture, which is not immediately connected with the execution.

In case of the irrigation of agricultural land resulting in an increased pressure on the soil, the project must foresee all necessary soil protection measures relating to:

- establishment of a fixed crop rotation and green fertilization, and
- changes in the plant protection practice.

Protection of natural and cultural heritage

Measures for the protection of natural and cultural heritage will be defined in compliance with its presence in the area observed after a conservation study will have been prepared.

Protection of landscape

The landscape near the reservoirs and the dam is to be restored in accordance with the landscaping design.
Special attention should be paid to preservation of forest edges in contact with the reservoirs and to integration of new ecosystems into the existing environment.

Realistically needed volumes of water are to be ensured in watercourses downstream from the dam and intake structures.

Special landscape interventions are to be carried out in cooperation with the forestry and biology experts.

Maintenance of facilities and infrastructure

All facilities and infrastructure constructed for the needs of the HPP Zhur are to be regularly maintained.

Landscaping

The area around completed structures shall be landscaped. Planting of the types of trees and bushes growing naturally in this area is recommended.

Sociology and demography

Considering sociological and demographic features of the space, all measures recommended in this section which relate to the improvement of working and living conditions are to be implemented during the project use. They relate to:

- climate change monitoring,
- water pollution,
- maintenance of infrastructural facilities and
- landscaping.

Implementation of above mentioned measures would provide the area with a permanent ecological and consequently a tourist value which would have positive effect on the population situation in both this and the wider area.

Measures for the Protection against Accidents

The basic measure for the protection against seismic activity is to locate facilities of the planned project in areas that do not lie on major regional faults.

Measures for the protection against the dam collapse are a constituent part of the Flood Control Operating Plan based on the meteorological and hydrological observation, forecasting, informing and alert system.

Another form of intervention is necessary in case of accidents associated with potential or actual pollution of reservoir waters. This segment relates to the water protection operating plan and must include measures and procedures for such cases).

Creation of the 50 m safety zone from high water levels in accumulations.

Measures Arising from International Obligations of the Republic of Kosova

Due to the Plavë Reservoir dam planned for construction on the Lumi Plavë River and due to the construction of intake structures on rivers Lumi Çaljane, Lumi Restelic, Lumi Brod, Lumi Leshtan-i and Lumi Radeshë for conveying water to the Plavë Reservoir, at this design level a biological minimum of the flow through the riverbeds in the area of the Republic of Albania was proposed, although the facilities of the planned HPP Zhur will be constructed in the area of the Republic of Kosova.The Republic of Albania was notified about the planned project, but has not responded with reference to the need to assess the transboundary impacts of the planned project in accordance with the Espoo Convention so far.

However, the assessment of transboundary impacts must be carried out in the context of the preparation of the Environmental Impact Study of the HPP Zhur.

Environmental Protection Measures after the Hydropower Plant Is No Longer in Use

The HPP Zhur is envisaged to be a permanent structure and therefore no such environmental protection measures are needed at this stage.

2.4.5 The Environmental Monitoring Program

This section describes the proposed environmental monitoring program, considering only the ecological aspects, while the technical monitoring of the project facilities will be covered by the basic design document for the project.

The basic condition for assurance of the environmental monitoring quality is that this activity is entrusted to an institution or a company authorized for carrying out the works.

The Environmental Monitoring prior to Execution of the Project

The environmental monitoring prior to execution of the project relates to:

- meteorological monitoring,
- seismic monitoring,
- hydrological monitoring and
- monitoring of the ecological status of surface waters.

The Environmental Monitoring during Execution of the Project

The monitoring activities are equal to the ones prior to the execution of the project.

The Environmental Monitoring during the Project Use

The environmental monitoring after construction of the planned project includes:

- hydrological monitoring
- seismological monitoring
- water protection and polluters
- ecological state of surface waters
- status of ichthyofauna
- status of terrestrial vertebrates
- forests and forest land and
- agriculture and agricultural land.

After the system is stabilized, the monitoring program is to be revised subject to the results obtained. Water-related monitoring activities must be brought in line with the European Directive on Waters and those related to habitats with the Habitat Directive.

2.4.6 Environmental Protection Costs Estimate And Their Share In The Project Execution And Operation Costs

The planned HPP Zhur project is a series of structures likely to cause adverse effects on the environment during construction and use, if they are not planned to be constructed and maintained in a proper manner.

The only additional costs arising from environmental protection measures are those relating to the environmental monitoring. Total annual costs of the environmental monitoring, exclusive of traveling costs, amount to:

	Cost Item	Costs (EUR/yr)
A.	**Prior to execution of the planned project – Total**	**35,000.00**
B.	**During execution of the planned project – Total**	**35,000.00**
C.	**During the use of the planned project – Total**	**102,000.00**

One-off costs are as follows:

Cost Item	Costs (EUR)
Equipment purchase and installation costs – Total	**63,000.00**
Costs of research and preparation of necessary studies – Total	**191,000.00**
One-off costs – Total	**254,000.00**

2.5 Task 5: Prepare a Preliminary Social Assessment (SA) including draft Resettlement Action Plan

General conclusions:

- General approval of the construction of the planned HPP Zhur was registered in the region. Items of that approval are explained as: better future of the state, more energy, and more development.
- Kosova State is seen as a guarantee for the successful accomplishment of the project.
- Representatives of local communities ask for more information concerning the project.

Preliminary Social Assessment

Due to the fact that the State of Kosova is greatly respected within the local population, as was registered during the Focus Group meetings as well as on different other occasions registered in the area, we believe that the Kosova state must have more active, more decisive and more stimulating role in the implementation of the HPP Zhur project as well as in the organization of any other actions that will make the life of local population more easy. That role could be expressed in the following manner:

1. The organization of production of urban and spatial plans for the region – it is very difficult to plan anything without the adopted general and detailed plans for future uses of land
2. Inclusion of the EU funds for future spatial developments
3. The production of well grounded plan for compensation of different kinds due to the realization of the project, based on the spatial plan
4. The development of programs, regulations and even laws that will stimulate the Kosova Diaspora to be motivated to engage financially and organizationally in the development of the HPP Zhur area. It could be easily predicted that the Diaspora will be interested to invest their money in the development of different economic

activities. The possibilities are numerous (concessions, share-holdings, establishment of small companies, financial donations, etc.), but everything must be grounded on solid legal frameworks.

5. The state of Kosova must also develop special social programs for the population that will be placed outside of normal possibilities of life in the area. This situation already exists in the area (very high rate of unemployment, very small average income, low education level of existing population, etc.), but through implementation of the HPP Zhur project the normal living conditions could worsen for many. So, the development of different compensatory socially-oriented programs must be completed in advance.
6. The state should develop clear procedural regulations concerning the potential future concession rights of the HPP Zhur plant. One of necessary preconditions is the regulation of property rights over land, clear cadastral and ownership records and regulations. It could be predicted that a future concession holder will not be interested and even capable to clarify today's potential unclear situations concerning these issues.

One of the facilitating and necessary conditions for the implementation of the HPP Zhur project is definitely the production of urban and spatial plans for the region. Due to the lack of urban and spatial planning documents, it is very difficult to predict the harmonization of the implementation of the HPP Zhur with other activities and services in the area.
When the urban and spatial plans are produced and accepted as official documents in the municipalities of Prizren and Dragash/Sharr, then concrete short- and long-term plans of development of the whole area could be prepared and elaborated. This especially concerns the positioning of future settlement structures as well as major infrastructure lines and capacities. Also, it is clear that this could facilitate potential resettlement plans.

As a positive influence of the construction of the HPP Zhur - we might predict that some other people will come and try to settle in the affected area due to some other, new economic possibilities that will be opened due to the realization of the project. It especially refers to the following:

a. Temporary or permanent employment of local workforce during the project implementation
b. Redevelopment programs – from extensive cattle breeding to intensive development with the investments into smaller farms. This will result in increase in production, and it could serve as a compensation measure for the reduction in a number and areas of the existing grazing land.
c. The development of different types of tourist activities and facilities due to the appearance of new water surface (lake), i.e., new restaurants, small lodges and hotels, recreational activities (boating, canoeing), and the like.

d. In this newly activated tourist capacities, new employment possibilities will emerge as well as the possibilities to invest personal assets into new incentives.

e. One of these economic activities could be aquaculture cages that could also provide the employment for local workforce and fish for local and wider areas. This is most likely to happen due to the fact that – most probably – some people will cease with their agricultural or cattle breeding activities due to changed conditions in the affected area.

f. An opportunity will also be provided in the case of the HPP Zhur project implementation – the reservoir will give a chance for an extension of recreational and hunting activities. The possibility of different kinds of uses of the reservoirs will also provide opportunities for many more people to visit the area for the recreation.

Due to the expected major changes in social and economic life of the existing population, the state of Kosova should influence future development programs as follows (major actions):

1. Stimulate financially and organizationally the change in the cattle breeding activities of local population – from extensive to intensive production (realizing conditions for the expansion of farms, their integration and diversification with reference to different products);
2. Organization of collection and placement of the products on the market through the existing market mechanisms and actors;
3. That change could provide the existing population with real possibilities to continue their existing practices of life and it could attract new population to come and stay in the area.

Expected direct and indirect benefits in the area could be realized only if the positive backing by the state will be provided. They do not concern only the potential development of different activities etc., but also the creation of feelings of security, protection and perspective for the local and potential new population to come to the area. They could be summarized in the following manner:

1. More intensive cattle breeding
2. The feeling of the local population that the existence in this area is promising
3. Social security must be provided for local inhabitants
4. The development of tourist activities connected with the reservoirs that will be created with different activities developed in the vicinity (camping, fishing, bird watching, hiking, skiing facilities and infrastructure on the near-by mountains, etc.), the development of restaurant and hotel industry, the development of secondary road networks, etc..

Draft Resettlement Action Plan

Major aspects related to the resettlement are connected with:

a. Due to the nature of activities of the locals (agriculture, cattle breeding) a problem of adequate land to be given in exchange for the impounded land was registered.

b. Due to the fact that very deep change in the style of life of that people could be expected, the negotiations must take into account their demands and individual situations very carefully.

c. The resettlement does not concern only housing units, but also the whole infrastructure of settlements, as well as individual plans, situations and contexts.

d. Due to the agricultural activities that are the main or additional occupation of many inhabitants in the affected area, after creation of reservoirs, the whole style of life in the area will be changed (other kind of land, flooded routes, water springs, longer distances to reach grazing land, etc.).

e. The resettlement plan is seen as a necessary consequence of the adoption-acceptance of the project.

f. Compensation of the affected population is seen in different ways - for example, land exchange by replacement with suitable land, exchange of property housing lots or even houses, money (cash) reimbursement.

g. Compensations due to the resettlement must be firstly and thoroughly registered – each case separately.

h. All compensations must be assessed according to the current market values of property. It was estimated that the cost of resettlement and compensations will be approx. EUR 28,500,000.

i. In some cases (Brezna village) a collective resettlement (all inhabitants should be resettled to a new place-location) was asked for and should be discussed.

j. The time schedule of resettlement assumes that houses, schools, health center, small business units, land and cemeteries must be organized prior to the beginning of any construction activity. Construction and relocation of roads, solution of problems with water supply and relocation of the transmission line could be carried out in parallel with the project construction activities, but have to be completed prior to the reservoir impoundment.

k. The Resettlement Action Plan should be based on the existing Kosova legislation (Property Expropriation Bill – still not promulgated) as well as World Bank Procedures specified in the Operation Manual Bank Policies, issued on September 25 2006 as well as other examples of good practices of similar policies.