EXECUTIVE SUMMARY

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The electric power system of Macedonia is a net importer of energy. Total energy consumption of Macedonia in 2001 was 6,251 GWh, out of which 5,817 GWh was generated locally mainly from thermal plants. The system peak demand is about of 1,300 MW. This situation puts the supply side under pressure and, when compared to the total capacity available, it reveals a deficit position.

This 400 kV transmission line will be the first significant interconnection between the power systems of Macedonia and Bulgaria with a transmission capacity up to 1000 MW.

In Macedonia, the environmental protection legislation is in place since 1996 and requires carrying out an ecology study for a project of this type. The approval of the ecology study and all the environmental permits were obtained in March 2002 from the Ministry of Environment and Physical Planning.

This report seeks to achieve an environmental Impact Assessment (EIA) according to the standards of the potential lending agency (European Bank for Reconstruction and Development). The bank's environmental procedures structured to meet national and European Unions standards (Directive 97/11/EC), are more exacting than the Macedonian requirements. The bank's procedures include also a formal two-step public consultation.

CORRIDOR ANALYSIS

Like for all linear projects, the corridor and route analysis are of paramount importance.

At the beginning of the project, ESM establishes an Expert Board and an Expert council responsible for proposing the best way for interconnecting both power systems. Two potential starting points on the Macedonian side were suggested:

- Sub-station "Skopje 4" in Skopje and
- Sub-station "Dubrovo" in Dubrovo

And two ending points at the Bulgarian side where proposed:

- Sub-station in Blagoevgrad, and
- Sub-station "Crvena Mogila" in Radomir

These pairs of starting and ending points can be connected with three power line corridors:

I: Dubrovo - Stip – Radomir (Bulgaria)
II: Dubrovo - Stip – Blagoevgrad (Bulgaria)
III: Skopje – Radomir (Bulgaria)

While the feasibility analysis for the connection to the end point were performed, the Bulgarian National Power Company (NEK) pointed out that due to its specific location, the sub-station in Blagoevgrad has no capacity for physical upgrading. Therefore, the existing sub-station "Crvena Mogila" in Radomir was pointed out as the only possibility for interconnection.

More over, the location of the sub-station "Skopje 4" and its potential line route requires the creation of new corridors through the urban zone in the surrounding of Skopje and Kumanovo, thus causing great technical, social, environmental and proprietary-legal difficulties. The location of the sub-station "Dubrovo" (in the vicinity of Thermal-electric plant “Negotino") does not cause such difficulties and since it is located in the central part of eastern Macedonia, would present a good position for solving the technical issues in this part of the country. For these reasons, the Dubrovno site was chosen as starting point on Macedonian side.

Further analysis was achieved to determine potential routes for the Dubrovo - Stip – Radomir (Bulgaria) connection. Three routes where considered:

A - The route along the river valley of Kriva Reka and part of the wider area of river Zletovska

B - The route along the river valley of Bregalnica River to the Bulgarian border

C - The route passing through the Osogovo Mountain with slopes north towards the valley of Kriva Reka and southeast towards the valley of river Bregalnica. This route is located between the two others. It has been abandoned early in the process since located in a mountainous area, with altitudes from 800 to 2060 meters above sea level, with severe climate and meteorological conditions (low temperatures, high snowfalls), hardly accessible terrain and highly valued forests. This rout has then been abandoned.

There was no significant difference between the physical, ecological, socio-economic or technical characteristics of the two remaining routes, the choice has been dictated by the two following considerations:

- The route A of the transmission line on the territory of Macedonia is within the infrastructure corridor 8 for 40 % of the entire route length. This corridor hosts the following infrastructures: railway, highway, oil pipeline, gas pipeline, Trans-Balkan fiber optic cable, 110 kV line etc. By grouping the necessary infrastructure facilities in a single mutual corridor, the route A would have a significant qualitative, quantitative and strategic advantage compared to the route B;

- The border crossing point is in accordance with NEK (Bulgaria) corridor analysis for the Bulgarian portion of the power line.

PROJECT DESCRIPTION AND JUSTIFICATION

The project consists in a 400 kV overhead transmission line (OHL) connecting the Stip substation (S/S) located near the city of Stip whit the Chervena Mogila substation located near the city of Radomir in Bulgaria. The project will also require additional investments in the Dubrovo and Stip Substations since the Dubrovo-Stip 400 kV line is

already constructed but is operated at 110 kV until the interconnection becomes operational.

The OHL will be built over a 19 months timeframe and the project requires an investment of approximately 40 millions US$ for the total project including 25 millions US$ for the Macedonian portion.

DESCRIPTION OF THE ENVIRONMENT

The section of the OHL route from Stip to a point between Kratovo and Probistip is in the Vardar zone. From there to the end of the route on the Macedonian-Bulgarian border, the terrain belongs to the Serb-Macedonian massif. The study area encompasses the following types of terrain from Stip to the border:

- Valleys that include either cultivated areas, wild vegetation and sparse trees;
- Hills with rare cultivated areas and wild vegetation or sparse to medium dense tree distribution;
- Mountains with wild vegetation or sparse to medium dense trees cover.

It should be noted that the proposed line is not passing near any major cities. The population encompassed in the vicinity of the OHL route (from 300 to 2 100 m from the OHL) is estimated at 5 884 persons. The largest percentage of the permanent population in the area of the OHL lives in villages and is active in the agricultural sector: cattle breeding, vine growing and beekeeping.

The agricultural land of the study area is not of high quality. As a consequence, the social-economic conditions in this area are difficult and considerably lower than the country's average.

It is estimated that around 60% of the land composing the right-of-way (ROW) is of private property. This private land is subdivided in 2,900 parcels with an average surface of 0.1 ha. The promoter (ESM) will have to negotiate the compensation with each landowner separately in compliance with the existing laws.

The OHL route passes through two main water streams: river Bregalnica and river Kriva Reka.

No endangered or protected species are part of the project study area.

The project does not affect any of the actual identified cultural or archeological sites and there is no tourist and recreation facility in the study area.

IMPACT ASSESSMENT

The construction phase will include a wide range of activities that may affect the environmental components of the project study zone. These effects are generally temporary except for the construction roads that may have impact for a longer period.

Considering the biophysical environmental components, earthwork and destruction of the vegetation cover for the construction of the access roads and the OHL will be the

main sources of erosion that could affect water quality by the transportation of dissolved material and solid particles into water bodies.

The excavation of important soil quantities for the tower's foundations and especially for the construction of the access roads will locally change the quality of soil by destruction of its profile, compaction and drainage disruption. IT must be noted however, that the soil quality in this rural area is already low.

Construction machinery as compressors, foundations vibrators, bulldozers, etc. and transportation activities (trucks, helicopters, etc.) are all sources of noise during construction that could affect people and fauna.

The vegetation cover in the ROW and for the access roads will be eliminated. This will constitute a loss of habitat that will also affect the fauna. Many of the individuals will be able to escape but they will be vulnerable to predation during a certain period of time.

The human environmental component will also be affected. The project construction activities will have for consequence the loss of agricultural and forest land. The area occupied by the tower's foundations will be acquired permanently (surface of approximately 50 m^2 for each tower). The right-of-way of the overhead transmission line, which represents a security corridor of a width of 60 m, will be used with implemented way-leave. That means that the owner's access to their land will be temporarily restrained during the construction works. These negatives consequences of the project will be taken into account by the existing compensation procedure.

The construction of this significant project (with investment of 25 millions USA $), will contribute to the social-economic development in the region around the route, as well as in the wider area in the Macedonian state.

The situation with the impacts assessment during the operational phase differs significantly from the construction phase. The OHL in regular operation does not emit gasses or waste, consequently no pollution of air, water or soil will be caused.

The impacts arise from the presence of the infrastructure and from the maintenance activities.

The vegetation control will be done manually and no chemicals will be used. One of the positive impacts of the project will be the maintenance of the vegetation at a pioneer stage that will favor some animal species. The ROW will also facilitate the movement of some fauna.

The power line will introduce a linear element in a landscape characterized by the agriculture and the mountainous landscape. This structural change of the landscape will affect people living in the areas from where the construction activities will be visible.

Power lines produce both electric and magnetic fields. To date, several scientific papers have been produced on EMFs and several independent and authoritative scientific panels have concluded that it has not been established that mains frequency EMFs cause adverse human health effects at the levels of electromagnetic fields to which people are normally exposed.

MITIGATION MEASURES AND MONITORING ACTIVITIES

The mitigation measures applied during the construction and operation phases, aim at reducing the environmental impact of the project.
Surface water streams will be protected from an increase of turbidity caused by storm water and run-off by the following controlling measures:

- Culverts would be dimensioned properly in accordance with the hydrological conditions; after the construction phase they can be removed or left as the Water Economy community orders.

- Vegetation cover will be reestablishing on the slopes susceptible to erosion to prevent transport of sediments towards the water streams.

In agricultural areas, it is important to reestablish the original drainage pattern after construction works are completed to avoid further losses of productivity.

Appropriate management of solid waste and treatment of wastewater from workers camp will avoid further contamination of the surface water.

Remediation of the degraded land and re-conversion of the land use after the construction works are the main measures to mitigate adverse impacts upon the landscape. To achieve this objective, the top soil should be put in reserve at the beginning of the earth works in order to be used for restoration purposes at the end of construction activities and the fill material at construction sites must be leveled in order to allow a good drainage of the surface water.

For the removal of vegetation, the working method must avoid that trees fall outside the working zone, causing damages to the vegetation unnecessarily. To protect the roots of the trees at the limit of the working area, the movements of heavy vehicles will be limited to the access roads and storage areas. At the end of the construction in the area affected by earth works, the vegetation cover will be restored with autochthones species compatibles with the power line operation.

The towers working areas will be fenced to prevent interference and protect cattle and wild fauna.

During maintenance activities the vehicles circulation will be limited to access roads and identified working area to reduce potential soil compaction. All maintenance works have to be carried out in agreement with the owners, after they have been informed of the purpose, lasting and the scope of the works on private land property.

When possible local workers will be hired to maximize the positive impacts of the project.

If the power line or the substation is decommissioned, all the structures will be dismantled and carried away for reuse or disposal according to the regulations. In agricultural land, concrete foundations for the towers must be removed (to the minimum depth of 70 cm) in order to re-enable agricultural use.

Based on projected environmental impacts, special attention will be given to monitoring of the following items: protection against erosion in the mountainous part of the

selected route and communication of information on construction schedule activities to users of the territory.

CONCLUSION

Among the 16 environmental components considered, none are at risk to suffer a major impact. After the implementation of the mitigation measures, the most severe impacts of the project have are rated Medium. Those components are landscape, vegetation and fauna. This assessment reflects well the context of the construction of a power line in a relatively remote area.

This assessment confirms the relevance of the choice of corridor and route alternatives analysis that have been performed previously.

During the project implementation, it is important that the environmental preoccupations should be taken in consideration all along the project development but more specifically during the preparation of the tender documents, the bids evaluation and the construction period. This will insure that the environmental preoccupations are integrated to the project realization.

PLANNED 400 kV LINE