Kosovo's Energy Options:

Response to the Sierra Club/INDEP Report: Re-evaluating Kosovo's Least Cost Electricity Option

Background

1. In December 2011, the World Bank issued a study entitled "Development and Evaluation of Power Supply Options for Kosovo: A Background Paper." This "Options Study" reviewed a variety of previous studies commissioned by the Government of Kosovo, the power sector entities, the World Bank, and other donors. Many of these studies considered a variety of alternatives to a new, large lignite-fuelled power plant that the Government of Kosovo is planning to build. However, a systematic, consolidated and up-to-date comparison and evaluation of the costs of energy alternatives had not yet been presented.

2. The Options Study provides this evaluation by covering the subjects necessary to any evaluation of a power generation project:

- power demand forecast
- power supply options
- alternative power supply development plans composed of a sequence of supply options
- comparison of the costs of meeting forecast power demand from each of the power supply development plans (incl. power plant construction and operating costs and the environmental and health costs related to these activities)
- sensitivity analysis of the results of the evaluation to changes in assumptions about key planning variables.

The Options Study concluded that Kosovo needs a mix of renewable and thermal (lignite) power generation capacity to meet its base load and peak load.

3. The Options Study presents a preliminary evaluation of a project to build 600 MW (2x300 MW generating units) of new lignite-fuelled power generating capacity (the proposed Kosova e Re Power Plant or KRPP), rehabilitate the existing Kosovo B generating plant, and open the new Sibovc lignite mine (collectively called "Kosovo Power Project"). Importantly, the existing Kosovo A power plant would be closed in conjunction with this project.

4. In January 2012, the following paper was also published about the Kosovo Power Project: "Reevaluating Kosovo's Least Cost Electricity Option" by B.C.Buckheit, prepared on behalf of the Sierra Club and the Kosovar Institute for Development Policy (INDEP) (referred to as "the Sierra Club/INDEP Report"). The Sierra Club/INDEP Report comments on two separate documents: the Expert Panel's Terms of Reference and the Options Study. The Expert Panel report was issued in January, 2012, in English and Albanian languages and was discussed by the Panel with civil society in Pristina in August 2011 and February 2012. Because a Terms of Reference for a study is not comparable to a fully scoped study, this note only responds to various points raised in the Sierra Club/INDEP Report about the Options Study.

Responses to Sierra Club/INDEP Comments on the Options Study

5. **Summary of the Sierra Report Study Recommendations.** The Sierra Club/INDEP Report concludes that the Options Study:

a. "Fails to demonstrate the need for a new base load coal plant" and recommends instead that Kosovo meet future demand growth through reductions in technical and non-technical losses, through improvements in energy efficiency, and by investing in generation intended to serve peak load on the Kosovo power system. This recommendation is put forth as an alternative to the KRPP base load plant recommended in the Power Option study.
b. "Fails to analyze the impact of developing KRPP on end-user tariffs or on Kosovo's economy."

Many of the Sierra Club/INDEP Report comments concern the amount and type of new capacity proposed by the Options Study. These comments question whether new coal-fired, gas-fired, or renewable power capacity should be added and whether capacity suited to meeting base load or peak load is needed. Separate responses to the comments about the magnitude of capacity needed, the fuel used, and the portion of the load shape served most economically by a new plant, are given in the following paragraphs below. The remaining responses deal with the tariff issue and with other comments in the Sierra Club/INDEP Report.

6. **Magnitude of new capacity needed.** The Sierra Club/INDEP Report asserts in many places that the Options Study concludes that more than 1,200MW of base load generating capacity should be brought online before other measures to balance future supply with demand. This assertion is incorrect. The only new baseload generating capacity proposed by the Options Study is the 600MW KRPP. About 700 MW of renewables included in the Options Study are either peaking (Zhur hydropower) plant, seasonal small hydropower plants, or intermittent renewables. If the Sierra Club/INDEP Report includes the reentry into service of the rehabilitated Kosovo B plant in its total of 1,200MW new base load capacity, this would ignore the obvious fact that the net addition to this capacity is zero (in fact a small reduction since the rehabilitated capacity is a little less than the rated capacity of the existing plant). The Options Study proposes the installation of some new renewables capacity and the initiation of loss reduction measures before KRRP enters service.

The demand-supply analysis used by the Sierra Club/INDEP Report to make its case is incorrect. It compares demand in 2010 in terms of the 2010 load curve provided in the Options Study, with the amount of new supply capacity proposed by the Options Study to come online gradually during the 2015-2025 time period. The Sierra Club/INDEP Report therefore does not compare like with like, because it does not recognize the considerable changes in both demand and supply that are projected to occur between 2010 and 2025. Demand will grow and supply will change as Kosovo A is retired and the output of Kosovo B is temporarily scaled back during plant rehabilitation. A correct analysis of the need for new generating capacity must take account of these changes by comparing demand and supply in the same year and for each year over the

planning period. The Options Study does this through simulated hourly dispatch of demand and available supply.

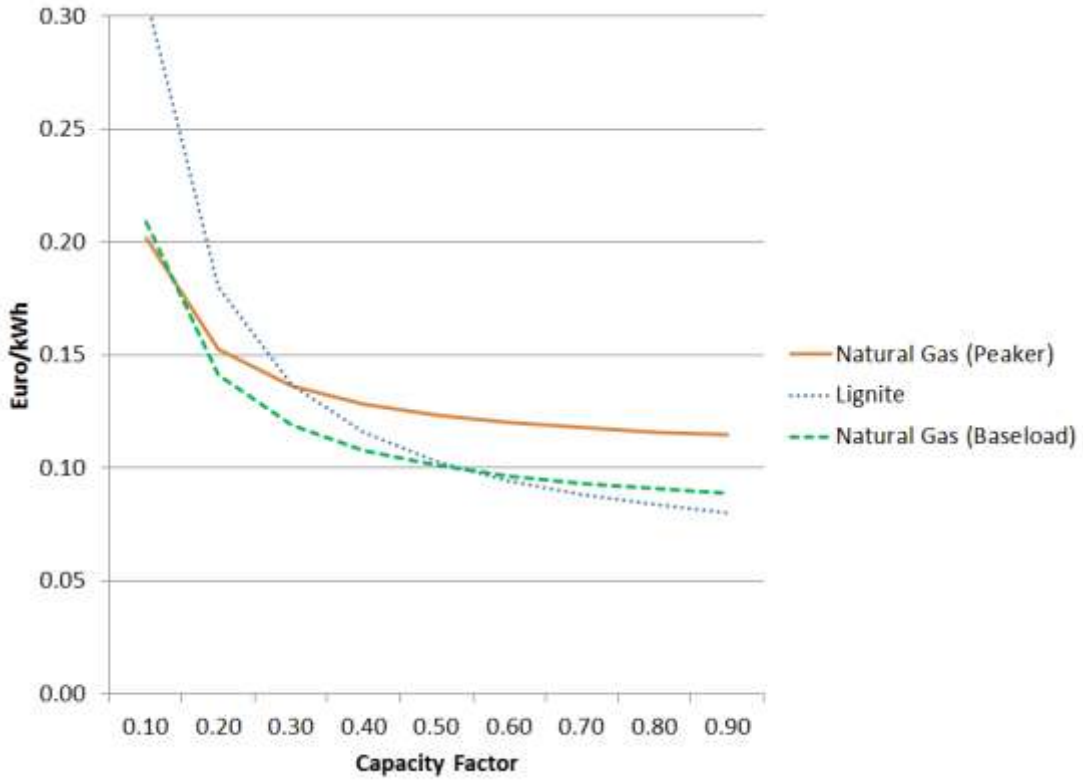
7. **Need for new base load or peaking capacity.** The Sierra Club/INDEP Report questions the need for new capacity to meet base load, recommending instead that Kosovo develop capacity to meet its peak loads. The Options Study, in contrast, finds that Kosovo needs new capacity to meet **both** base load and peak demand in the future.[1] This is provided by a mix of thermal energy, renewables, reductions in losses, and improvements in energy efficiency (referred to in the Options Study as the Lignite+RE plan). The Options Study assumes that the 300 MW Zhur Hydropower Plant and imports will be used to meet peak demand, as may some of the non-dispatchable renewables (small hydro or wind). The Sierra Club/INDEP Report does not address how Kosovo will meet its substantial intermediate load, instead erroneously presenting Kosovo B and KRPP as alternatives for meeting the base load. In fact, both plants are needed to meet the base load plus intermediate load. Kosovo has no reasonable alternatives to using this combination of plants for meeting these loads with sensible plant management.[2] The Options Study's assumptions about renewables are already aggressive, given what is known (and summarized in the Options Study) about the economic viability of different types of renewables in Kosovo, and firm import capacity is not likely to be readily available, given the tight power supply in the region.

8. **Need for a new lignite plant instead of a gas plant.** The Sierra Club/INDEP Report also suggests that a gas plant could be used to serve peak load in Kosovo. Gas peaking plants have lower capital costs than gas base load plants, but higher fuel costs per unit of electricity produced when this capacity is operated above certain low capacity utilization levels (e.g., below 10%).

[1] Plants used to meet peak demand have different cost and operational characteristics from plants used to meet base load. Plants used to meet peak demand typically have higher operating costs (fuel and non-fuel) and lower fixed costs (primarily, construction costs) than plants used to meet base load demand. It is also easier to adjust the output of so-called peaking plants to wide variations in demand. In practice, all types of plants (base load and peaking plants) are used to meet peak demand, but the peaking plants can more rapidly and cost-effectively be scaled up and down to meet hourly fluctuations in demand.

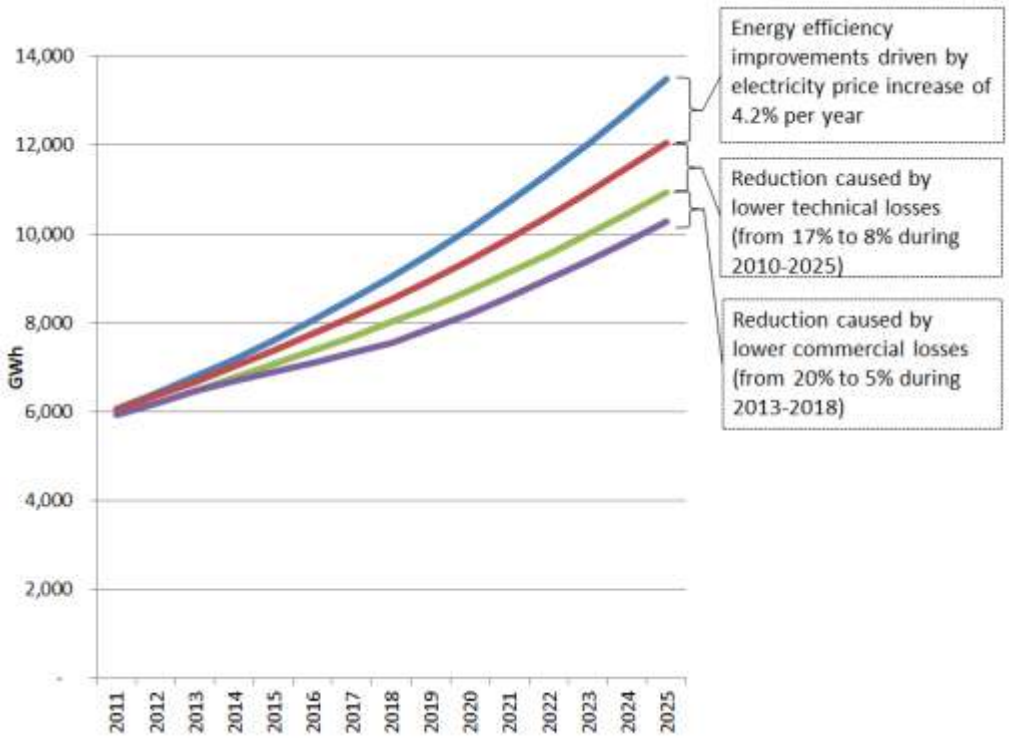
[2] In actual power system operation, unnecessary cycling of coal units will be avoided by taking units out of service, especially during period of low demand, and taking the opportunity to carry out scheduled maintenance.

The figure below compares the cost (including environmental externalities) of an open cycle gas peaking plant to those of the gas plant and lignite plant used in the Options Study.[3]



9. Need to reduce losses and improve energy efficiency. The Sierra Club/INDEP Report recommends that reducing technical and non-technical losses, and improving energy efficiency, should be made priorities. This agrees with the approach in the Options Study. The demand forecast in the Options Study assumes reductions in technical and non-technical losses. Technical losses are assumed to reduce from 17% to 8% of net energy generation by 2025. Non-technical losses are assumed to reduce from 20% in 2013 to 5% in 2018. The Options Study also assumes improvements in energy efficiency, driven by a real increase in the tariff of 4.2 percent per year. The figure below shows the magnitudes in improvements in energy efficiency and reductions in losses assumed relative to the Options Study's base case demand forecast (the bottom, purple line). The Sierra Club/INDEP Report asserts that the reduction in commercial losses assumed by the Options Study is more aggressive than is realistic, and that the reduction in technical losses is insufficiently aggressive, but it does not provide evidence to support these assertions.

[3] The gas plant is assumed to have 38% efficiency, capital costs of €575/kW, fixed O&M of €6.9/kw-year, and variable (non-fuel) operating and maintenance expenses of €.075/kWh. Fuel purchase costs are assumed to be the same as for the gas plant in the Power Supply Options Study. The figure shows that the levelized energy cost of the gas peaking plant is higher than for the gas base load plant if it were to be used at capacity factors above 10%.



10. **Effect of the tariff increase on end-users and Kosovo's economy.** The Sierra Club/INDEP Report asserts that: (a) the Options Study underestimates the required increase in Kosovo's electricity tariffs to finance the costs of developing KRPP and (b) the Options Study assumes that the tariff increase has already been increased to fund this project. The first of these assertions arises from confusion between economic and financial analysis[4] and the second assertion is incorrect. In fact, the Options Study did not address the question of tariffs at all, because it undertakes an economic analysis and does not deal with financial matters such as electricity tariffs. Moreover, the Options Study certainly did not assume that this tariff has already been increased to fund this project. The Options Study did estimate the price for electricity that would cover the economic cost of increasing long-term power supply capacity to meet the forecast growth in power demand, but only for the purpose of deriving an economically efficient level of power demand on which to plan the expansion of Kosovo's power supply capacity. The impact of the project on tariffs will form part of the project appraisal process within the World Bank, which is being planned. However, because the lignite plant has the lowest **economic** cost of all the thermal generating options analyzed by the Options Study (including environmental externality costs that are part of economic analysis only, not

[4] Economic analysis is concerned with the costs of a particular generation option to a country's economy or society as a whole. Financial costs are concerned with the costs to investors (which investors will pass on to customers).

financial), with similar financing terms, the lignite option will also require the lowest **financial** increase in electricity tariffs out of the thermal options.

11. **Other recommendations of the Sierra Club/INDEP Report:** The Sierra Club/INDEP Report further recommends that Kosovo B should be given dispatch priority over whatever new plants are built (criticizing the Options Study for assuming that the new lignite plant would be dispatched before Kosovo B). This recommendation means running more expensive, more polluting plants in favor of less expensive, cleaner ones. Such a recommendation cannot be reasonably justified for operational reasons, as well as for environmental/human health reasons. Commonly accepted industry practice is to dispatch the units with the lowest variable operating costs (sum of fuel cost and Operating and Maintenance cost per unit of energy generated).

Responses to the Sierra Club/INDEP Report's Additional Concerns

The Sierra Club/INDEP Report raised some additional concerns about the omission of the cost of opening a new mine in the Options Study, stressed water supply and its impact on agriculture, and resettlement. These issues are clarified below.

Cost of new mine. The cost of opening and operating a new mine for meeting the fuel needs of a new 600 MW power plant, rehabilitated Kosovo B, and Kosovo A for its remaining life is reflected in the cost of lignite (€10.5/ton) that is used in the Power Options Study[5].

Water supply. Although KRPP is expected to increase water consumption in the region, there is currently sufficient capacity in water supply to the region, in particular from the Iber-Lepenc canal to provide water to KRPP and all other consumers, including the supply of drinking water[6]. Improvement to the Iber-Lepenc canal system would help reduce leakages from and increase supply for all users. To support future provision of water to the area for all water needs, the World Bank will prepare additional investment projects. Such investments have been included in the Country Assistance Strategy for Kosovo for 2012-15.

The Environmental and Social Impact Assessment (ESIA) for the proposed project will examine the water resources and needs, assess possible current and future risks associated with the KPP's water consumption, and identify actions and investments that need to be made to eliminate or

[5] Table 4.1 of "Development and Evaluation of Power Supply Options for Kosovo" December 2011

[6] "Water Supply from the Iber-Lepenc Hydro System for the proposed Kosovo C Power Plant" COWI and others 2007. The study showed that there was enough water available for the new 2000 MW power plant, increase in sown area from 650 ha to 10,000 ha, and for industrial and domestic users. Please note that the 2007 study assumed a 2000 MW Kosovo C, while the proposed capacity is only 600 MW.

mitigate these risks, if any. An important requirement of the ESIA is that all stakeholders, including the local population, will have the opportunity to voice concerns and request that specific issues be covered in the ESIA and to discuss draft results and mitigation actions to assess whether these are acceptable.

Resettlement. Development of the KPP will require, over time, the relocation of people primarily from the new lignite mine concession area in Sibovc. The new mining concession, which forms part of the KPP, is being developed to provide coal only to KRPP (600 MW) and Kosovo B, and to Kosovo A for the remainder of its life span. However, the new concession area covers only a part of the large reserves found in Sibovc. No household reported earning income from agriculture though some used it as a complementary activity. Currently only a part of the Shala neighborhood would require relocation. However, during consultations the members of the Shala community expressed their desire to be relocated together, as one social unit. Responding to the community's wish, the Resettlement Action Plan has been prepared for the entire Shala neighborhood, which will relocate to the proposed site at Shkabaj village.

This resettlement is being carried out in conformity with the Kosovo Resettlement Policy Framework and the applicable World Bank requirements. In preparing the RAP, the Shala community was widely consulted and involved in the design of the resettlement, with a focus on achieving a satisfactory and sustainable relocation. The community supports the identified resettlement area, which is in a good location and close to the main highway to Prishtina. At present, work is being conducted by the GoK to prepare the resettlement site. Housing plots are being developed and will be provided with services (access roads, water, electricity, etc.). Most of the people moving from Shala have chosen to build their own houses in the resettlement area. Government is committed to provide assistance for lodging and subsistence to those relocating during the interval between leaving Shala and moving into new housing at the resettlement area. The MoESP, as the implementing agency, provides information on implementation progress through an on-going consultation process with affected parties and municipal officials.

12. **Conclusion.** We agree with theSierra Club/INDEP Report that technical and non-technical losses should be reduced and end-use energy efficiency increased to reduce the required amount of new power generation capacity and the environmental impact of power generation. These priorities are reflected in the Options Study. We emphasize that the Options Study presents an economic analysis, rather than a financial analysis that would be carried out as a part of the World Bank's appraisal of the proposed project. Future financial tariffs will depend on the terms for construction of KRPP offered under competitive bidding which depend partly on the financing terms that investors are able to obtain for these generation investments, as well as on the pace of efficiency improvements, loss reduction, and network improvements that will be included in the power suppliers' rate base by the energy regulator, and demand-side measures implemented by the distribution and supply licensee.