World Bank Kosovo Power Project Environmental and Social Impact Assessment: Comments on the Kosovo Ibër Lepenc Water System Study

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The World Bank is currently considering a $58 million Partial Risk Guarantee (PRG) for the proposed Kosovo Power Project, which involves building a new 600 megawatt lignite coal-based power plant, known as Kosova e Re Power Project (herein referred to as KRPP), and expanding open pit coal mining operations. The Government of Kosovo and the World Bank have agreed to commence the preparation of an Environmental and Social Impact Assessment (ESIA) for the proposed Kosovo Power Project. The ESIA will serve to inform the World Bank's Board of Directors in considering whether or not to approve the PRG.

As part of the preparation of the ESIA, the World Bank has released a draft Terms of Reference (TOR) for the consultant who will be hired to carry out the ESIA. The TOR stipulates that for the preparation of the ESIA "it can be assumed that all baseline data required for the assessment of the quality and impacts on air, surface water, groundwater and soil are already available or will be made available to the Consultant."[1] With regard to impacts on water, the TOR lists a March 2011 study of the Iber Lepenc Water System[2] as one of the available studies to be integrated into the ESIA.

The economic heart of the country largely depends on water coming from the Iber-Lepenc canal[3] that conveys water from the Gazivoda reservoir in the north, which lies partly in Serbia. The KRPP and expanded coal mining operations will receive its water supply from the Iber Lepence system. This system is already considered to be "severely stressed."[4] Thus, any activity that will increase the water demand from this system needs to be carefully analyzed and clearly presented to the population it will affect.

The following document provides an assessment of the quality of the available 2011 Iber-Lepenc Water Study to be utilized by the ESIA consultant.[5] The main finding is:

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[1] Kosovo Power Project ESIA draft TOR, pg. 6

[2] Water Security for Central Kosovo - *The Kosovo - Ibër River Basin and Ibër Lepenc Water System.* Ministry of Environment and Spatial Planning. March 2011, edited March 2012. In addition, it should be noted that the TOR also lists: *Water Supply from the Iber Lepenc hydro system for the proposed KRPP, Evaluation of the hydro system and water availabaility assessment at the entrance of Pridvorice-Obiliq Canal,* November 2007.

[3] The canal currently supplies water to the hydropower plant (35 MW), to the towns of Mitrovice, Vushtrri, and some smaller neighbouring towns, to Kosovo B thermal power plant (and emergency supply to Kosovo A power plant), the industrial development zone along the Durrës-Prishtina--Belgrade corridor, and a small amount of irrigation. Over the next few years, the canal will also supply bulk water for Prishtina municipality (starting in 2013), for the KRPP (after 2014), as well as the expected substantial expansion of irrigated areas.

[4] *Water supply from the Iber-Lepenc hydro system for the proposed KRPP* (February 2008), funded by the European Agency for Reconstruction (EAR) and developed by COWI consortium. Currently, the water exploitation index (WEI) for the Iber Lepenc system is assessed at 50% for an average year. Severe water stress can occur where the WEI exceeds 40%.

[5] According to the ESIA TOR pg. 6: the Environmental and Social Scoping Study (ESSS) will, in particular, identify the quality of available data and missing baseline information, i.e. perform information gap analysis that will be required for the full impact assessment under the ESIA.

Even with system improvements, a secure water supply for all users of the Iber-Lepenc water system, including the proposed Kosovo C power plant, is uncertain[6] because:

- **The quality of data is poor**. Much of the data and information used in the 2011 Water Study is outdated or highly uncertain, including: population growth, water connections, irrigated land growth, groundwater parameters, water demand and consumption, water uses, climatic parameters, groundwater quality and abstraction, land use information, climate change impacts, and sources/levels of pollution.

- **The water system modeling results do not represent a realistic range of potential water demand scenarios for the Iber-Lepenc system.** The modeling results, specifically those for Gazivoda, are based on a very limited selection of data inputs. The 2011 study lays out several proposed scenarios, but then only presents the WEAP model results based on conservative inputs, e.g., low population growth; moderate growth in irrigation; and decreased per capita consumption.

- **The boiler, cooling, and pollution abatement technology of the new Kosovo C power plant is not specified.** It is impossible to evaluate the water use of the new coal-fired power plant not knowing the boiler design, cooling technology, and pollution abatement technologies. The 2011 study only makes assumptions for cooling technology.

- **The water use of the expanded mining operations.** The proposed World Bank Kosovo Power Project involves "the development of an open-cast lignite mine and associated infrastructure." Open pit coal mining requires large amounts of water for the coal processing plant and dust suppression. The 2011 Water Study does not account for the coal mining operations

- **Significant transboundary issues remain unsettled.** The water in the Iber-Lepenc canal is abstracted from the Iber river, which passes through Serbia on its way into the Gazivoda reservoir and its Iber-Lepenc canal in Kosovo. The ESIA will need to address significant transboundary concerns, including ensuring that Serbia and other downstream riparian countries are notified and consulted with according to international law and EU directives.

- **There is no guarantee that proposed water system improvements resolve the expected water shortages**.[7] Without improvements to the Iber-Lepence canal system, the water study's model for the Gazivoda system concludes that "In the long run 2020-2035, especially in the case of the climate becoming drier, there is a high probability that structural water shortages will occur during normal summers."[8] In response to current and potential future water shortages, the

[6] In order to be in compliance with Kosovo's Water Law and the EU Water Framework Directive 2000/60/EC, Kosovo will need to establish water management practices and a strategy that ensures long-term water supply to the residential, industrial, energy, and agricultural sectors.

[7] As part of Kosovo's Country Partnership Strategy, the World Bank proposes a *Water Supply Project* for FY2015. This project intends to improve the water supply from the Ibër-Lepenc Canal through the repair of the canal, protection against physical damage, short-term storage along the canal, and capacity building in the Canal management entity. It is uncertain whether this project will be implemented and to what degree and under what specific circumstances the planned water system improvements ensure long-term water supply to all users.

[8] Water Security for Central Kosovo. Table 35, pg. 151

water study makes several recommendations "geared to increase supply reliability and resilience to the likely demand variability" in the Iber-Lepence system, including repairs to reduce leakage and develop new storage capacity. However, there has been no analysis to determine whether or not these measures, if in fact implemented, would ensure the necessary water supply for all users across the range of realistic scenarios.

Recommendations:

In order for the ESIA of the World Bank proposed Kosovo Power Project to produce an accurate Iber-Lepence water system analysis, it must:

- Halt preparation of the ESIA until boiler design, cooling technology, and pollution abatement technologies have been specified for the KRPP because it is impossible to evaluate the water use of the new plant without such specifications.

- Generate water modeling outputs for the full range of potential future water balance scenarios for the Iber-Lepence water system. The modeling outputs should at least represent three scenarios, 1. moderate increase in drinking water demand and moderate increase in irrigation; 2. high level increase in drinking water and high level increase in irrigation; and 3. high level increase in drinking water and high level increase in irrigation in an extremely dry year (i.e., potential climate change impacts).

- Collect primary data, including: population growth, water connections, groundwater parameters, water demand and consumption, water uses, climatic parameters, groundwater quality and abstraction, land use information, and sources/levels of pollution, which in some cases will involve a period of continuous monitoring.

- Account for the current and future unmet water demand stemming from the Badovc and Batllava reservoirs that will be shifted to the Gazivoda/Iber-Lepence canal.

- Account for water use by the expanded open pit coal mining operations and conveyance of coal from the mine to the power plant, including: dust suppression, coal washing, and machinery lubrication.

- Ensure that water demand from the KRPP plant does not conflict with the goals of the Agriculture and Rural Development Strategy 2009-13, including increased income levels; improved quality standards; increased employment opportunities; and facilitated entry to the EU.

- Determine how pollution, including water pollution, from coal production and combustion impact Kosovo meeting EU quality standards for its agricultural products.

- Assess the opportunity costs of the new coal plant, i.e., hectares of agricultural land that cannot be irrigated due to water used by Kosovo C.

- Account for the full range of expected increases in drinking water demand, including a complete range of population growth rates from high to low and migration trends.

- Use at least three different scenarios (decreasing, stable, and increasing) for per capita consumption rates.

- Account for the growth in piped water connections.

- Determine whether or not extensions in the piped water will need to take place in order to supply safe drinking water to additional villages outside the locations currently served.

- Determine the additional pollution to groundwater and the Sitnica River from the proposed KRPP and mining operations, including all heavy metal pollution.

- Given the project area already suffers from severe pollution, the ESIA needs to consider the additional project-associated surface water and groundwater pollution in the context of cumulative impacts (e.g., the current high concentration of heavy metals in soil and river sediments will increase and continue to leach into the water supply).

- Address significant transboundary concerns, including ensuring that Serbia and other downstream riparian countries are notified and consulted with according to international law and EU directives.

- Assess the impact of planned water use and water discharges of the proposed KRPP and the mining operations on the water quality and water supply to Serbia.

- Account for water demand growth from upstream and downstream of the Gazivoda reservoir stemming from neighboring Serbia.

The rest of the document provides background information from the 2011 Water Study and a discussion of the issues and recommendations.

Missing or Unreliable Data

There are several indications in the 2011 Water Study that render the available data lacking and uncertain, including:

> Table 2 on page 37 indicates that there is only estimated or poor quality data available for significant data inputs, including: water demand and consumption, water uses, climatic parameters – precipitation & temperature; groundwater quality and abstraction; land use information (important for agriculture assumptions, etc.); agriculture production and economic information; climate change impacts, and sources/levels of pollution.
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> On page 39, the study further states that "recent hydrological data are lacking or not reliable enough for processing under the limited time of this study."

> Paragraph 13 of the Executive Summary: "The Gazivoda reservoir has ample reserve capacity, however, it should be noted that the water demand as per 2010 is still severely depressed in all sectors, and will over the next 5-10 years see a marked increase, that at this stage is not possible to define more precisely."

In addition, the 2011 Water Study did not account for unmet demand for the Badovc and Batllava reservoirs (Executive Summary, paragraph 21):

> "these simulations for the Gazivoda reservoir assume that unmet demand for the Badovc and Batllava reservoirs from the areas south and east of Prishtina would not be shifted to the Gazivoda/Ibër-Lepenc canal system. Nor do these simulations anticipate that growing land and pollution pressures on these reservoirs may actually depress their supply capacity. It is likely, however, that over the next two decades a growing demand from this part of the basin will be effectively shifted to the Gazivoda/Ibër-Lepenc canal, which would irrevocably lead this system to meet its maximum supply capacity sometime between 2020 and 2030."

- **The ESIA needs to collect primary data on most of the significant data inputs, including: population growth, water connections, groundwater parameters, water demand and consumption, water uses, climatic parameters, groundwater quality and abstraction, land use information, and sources/levels of pollution, which in some cases will involve a period of continuous monitoring.**

- **The ESIA needs to account for the current and future unmet water demand stemming from the Badovc and Batllava reservoirs that will be shifted to the Gazivoda/Iber-Lepence canal.**

Water Requirements of the New Kosovo C Power Plant

The water supply for Kosovo A is taken from the Llapi River. When the Llapi river flow is too low in the summer, water is taken from the Ibër- Lepenc canal. Kosovo B is and KRPP will be supplied entirely from the Ibër-Lepenc canal. Both Kosovo A and B plants discharge and KRPP will discharge to the Sitnica River. The Sitnica River is polluted with heavy metals, suspended solids, sulphate, nitrate, and chlorine.[9]

The ESIA TOR (page 3) states that "It is expected that the winning bidder of the [KRPP] concession will be selected during the period of ESIA preparation. As a consequence and as noted above, the ESIA will start without knowledge of details on design details or technology choices etc. but instead will be based on the standards that have to be met."[10]

No specification of the technology for KRPP poses a huge challenge when doing a water analysis as there is no standard/specific requirement for cooling systems, which account for the largest amount of water

[9] 2011 Water Study, page 73.

[10] According to the ESIA TOR, pg. 10, the following elements will need to be addressed, *inter alia*: lignite characteristics, lignite extraction and transport (extraction techniques, transport of coal to plants, separation and mixing, drying process), power cycles boiler systems, cooling cycles including an overview of the water supply and water balance (showing flow calculations, indicating discharge, recycling, evaporation, surface water use, treatment etc.), pollution treatment and abatement equipment (precipitators for fly ash and fly ash storage, bottom ash collection, transport and storage, gypsum etc.), hazardous waste use, handling, and storage (diesel, fuel gasoline, lubricants)..

used for a coal plant. Furthermore, water requirements vary greatly between cooling technologies, e.g., once through systems vs. cooling towers. If the cooling system is not a once through system, there is still need for cooling water makeup: a separate makeup stream to the cooling tower. [11]

In addition, the 2011 Water Study appears to only consider water requirements for the cooling process.[12] It does not account for: boiler water make up; sanitary use; washing water; slurry preparation for ash transportation; water injection for NOx control or power augmentation.[13] Even though these processes require much less water than cooling, they still need to be accounted for. For example, water requirements for cleaning or scrubbing coal are significant to produce and handle the various process streams, including limestone slurry and scrubber sludge. Makeup water requirements for a 550 MW coal-fired plant with a flue gas desulfurization island, to lower the emission levels for sulfur dioxide (SO_2) and help prevent acid rain, are about 570 gallons per minute (gpm), compared to about 9,500 gpm for cooling water makeup.[14]

Water injected into a combustion turbine must be highly pure to eliminate introduction of contaminants directly to the turbine and the very stressful environment within. What technology is used for dealing with dissolved solids on the front end will determine how much water is recovered for use in the plant (Reverse osmosis (RO) technology can have a 50 and 75 percent (second pass RO[15]) recovery rate or even higher depending on technology.) [16]

According to the 2011 Water Study, the expected water use for cooling the new power plant is 380 liters/second [or 100 gallons/second or 6,000 gallons/minute].[17] This seems high compared to a planned 300 megawatt power plant in the US, which is reported to use public water at 2,000 to 3,000 gallons per minute.[18, 19] The difference may be due to assumptions on cooling technologies utilized.

However, it is unclear how much of the 380 l/s is counted as extraction from the Iber-Lepenc system in the WEAP model simulation because the 2011 Water Study states that most of the water demand for the KRPP is not consumptive.

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[11] More and more, grey water use is being adopted as a method to conserve fresh water. But, reclaim water as makeup often comes with a price. One potential difficulty is suspended solids, which can cause fouling in cooling tower fillBuecker, Brad. 2012. Power Plant Water Flow: Where Does the Water Go?. *Power Engineering*, July 2012. Pp.64-67.

[12] [2011 Water Study, pg. 81] The analyses have taken into consideration the water conveyance for cooling the new Kosovo power plant.

[13] Buecker, Brad. 2012. Power Plant Water Flow: Where Does the Water Go?. *Power Engineering*, July 2012. Pp.64-67.

[14] Dr. Robert Peltier,"New coal plant technologies will demand more water" PowerMag, April 15, 2008

[15] Second pass RO permeate is still not good enough for high-pressure steam generators.

[16] Buecker, Brad. 2012. Power Plant Water Flow: Where Does the Water Go?. *Power Engineering*, July 2012. Pp.64-67.

[17] 2011 Water Study, Table 30, page 130.

[18] Department of Energy, National Energy Technology Laboratory, Power Plant-Water R&D Program**.** Barbara Carney, Thomas Feeley, and Andrea McNemar U.S. Department of Energy/National Energy Technology Laboratory. http://www.netl.doe.gov/technologies/coalpower/ewr/water/pdfs/NETL%20Paper%20Unesco%20Conference.pdf

[19] According to the Union of Concerned Scientists, a typical 500-megawatt coal-fired power plant draws about 2.2 billion gallons (8.3 billion liters) of water each year from nearby water bodies, such as lakes, rivers, or oceans, to create steam for turning its turbines.[19] This is enough water to support a city of approximately 250,000 people. Union of Concerned Scientists, 2012. http://www.ucsusa.org/clean_energy/coalvswind/c02b.html

Water consumption for a coal plant typically represents water that must be made up to account for evaporation in the cooling tower and a relatively small amount that is consumed in unit operations within the generation process (boiler makeup).

In once through cooling systems, the actual water consumed is less than cooling towers because there is relatively little evaporation and most of the water is returned back to the body of water (at a higher temperature). However, in the case of the Iber-Lepenc system based on the Gazivoda reservoir – it is not clear that one could consider the water being returned for use within the same water body (e.g., lake, river) because the water is released to the Sitnica River, thus it might result in lower reservoir levels.

- **The preparation of the ESIA should wait until boiler design, cooling technology, and pollution abatement technologies have been specified for the KRPP because it is impossible to evaluate the water use of the new plant without such specifications.**

Coal Mining Operation Water Requirements

The ESIA TOR states that the proposed Kosovo Power Project involves "the development of an open-cast lignite mine and the associated infrastructure including, the mine area where the ash will be disposed." The new mining field will acquire approximately 13% of the territory of the Obiliq Municipality (SESA, 2008), or about 11 square kilometers.[20]

Open pit coal mining requires large amounts of water for the coal processing plant and dust suppression. These water resources (once separated from their original environment) are rarely returned after mining, which often leads to a permanent degradation in local water resources. Water is used daily in coal mining operations to cool and lubricate mining machinery, wash haul roads and truck wheels to reign in airborne particulates, and to suppress underground coal dust that otherwise could ignite.[21] In addition, large quantities of water are frequently needed to remove impurities from coal at the mine, i.e. washing the coal.

Coal mining can also contaminate bodies of water with heavy metals when the water used to clean the coal is discharged back into the environment. Further, if rain falls on coal stored in piles outside the power plant, the water that runs off these piles can flush heavy metals from the coal, such as arsenic and lead, into nearby bodies of water.

The 2011 Water Study does not specify any water use by the new open pit coal mine.

- **The ESIA needs to account for water use by the expanded open pit coal mining operations and conveyance of coal from the mine to the power plant, including: dust suppression, coal washing, and machinery lubrication.**

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[20] Final Draft New Mining Field Development Plan (NMFDP). This Draft NMFDP was developed under the LPTAP as a planning document which sets out the future spatial development scenarios of the new about 11 square kilometer sized lignite mine that will be opened in the *New Mining Field* (NMF), previously known as —Sibovc Mine to serve the new *Kosovo C Power Plant.*

[21] Sierra Crane-Murdoch, "A Desperate Clinch: Coal Production Confronts Water Scarcity" Circle of Blue, August 3, 2010.

Agriculture Water Requirements

The 2011 Water Study does not consider enough hectares for potential irrigation. On page 134, the study states: "In order to identify hot spots, in the WEAP model, the worst case situation has been taken into account: The assumption was made that in 2020 the surface irrigated will equal 8,000 ha, according to the data collected from ILC Company. In the period 2020-2035 the irrigated area will remain constant."[22]

A World Bank technical mission that took place in March 2008 (SESA, 2008) raised concerns that the water study commissioned by the European Agency for Reconstruction[23] had underestimated agricultural irrigation developments. The World Bank's concerns stemmed from the fact that the study assumes 5,000 and 10,000 ha, a figure much lower than the reference value of 20,000 ha at the time of the Iber-Lepence canal construction and that the Ministry of Agriculture, Forestry and Rural Development foresees bringing 18,000 ha under irrigation (with water from the canal) to further develop the agriculture sector in the medium (5-10 years) to long term.

A worst case scenario based on 8,000 ha of irrigated land greatly diminished the Ministry of Agriculture, Forestry and Rural Development's target of 18,000 ha. The 2011 Water Study does not provide a clear explanation for why the targeted amount of irrigated land has been greatly reduced. On page 67, the study states that "As a result of [an] unregulated urbanization process and of the construction boom, a percentage of cropland and irrigated land is lost for agriculture. The Consultant has estimated for simulation purposes that the percentage of irrigated surface lost in irrigated perimeters to be around 2 percent of the total." Assuming unregulated construction continues, 2% of 18,000 ha would only be 360 ha, which does not justify the assumption of only 8,000 ha of irrigated land.

Furthermore, the World Bank and international donors are funding programs to assist the government of Kosovo to promote competitiveness and growth in agriculture sectors over the next decade through implementation of measures in the Kosovo agricultural strategy.[24] In grant applications to the World Bank Kosovo Agriculture and Rural Development Project, water supply and irrigation are mentioned as input for agriculture projects involving livestock, greenhouses, and vineyards.[25] The 2011 Water Study bases its water requirements for agriculture on potato crops. The agriculture projects supported by donors are targeting tomatoes, apples, vineyards, and livestock. Thus, potato crops may not be the best indication for future agriculture development and associated irrigation.

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[22] There appears to be a mistake in the Executive Summary which states that the Gazivoda system scenario 2 uses 10,000 ha of irrigated land.

[23] *Water supply from the Iber-Lepenc hydro system for the proposed KRPP* (February 2008), funded by the European Agency for Reconstruction (EAR) and developed by COWI consortium.

[24] For example, the World Bank's Kosovo Agriculture and Rural Development Project documents state that: the project is helping to improve the quality and marketing of processed food products, (as well as fresh produce), adapting them progressively to meet EU standards. (a) support innovation and modernization in the agro-processing sector; (b) restructure the agro-processing sector; (c) develop higher value-added products that fulfill international hygiene, food safety and quality standards for consumers; (d) introduce environmentally friendly technologies; (e) improve efficiency; improve the marketing and labeling of quality products (processed and fresh); (f) improve the structure for, and enforcement of, quality, sanitary, veterinary and plant protection.

[25] Water supply for milk production is mentioned as an input being paid for by 81 grant applications to the World Bank program. Irrigation is mentioned for greenhouses in 212 applications and for vineyards in 277 applications. Word Bank Appraisal Document for the Kosovo Agriculture and Rural Development Project, May 2011. Page 53.

It is very important that the Power Project's ESIA carefully prepares the water analysis for the Iber-Lepence system as insecure water provision might hamper agricultural development. The agriculture sector is the highest employer in Kosovo and the biggest contributor to GDP.

One goal of the World Bank's Kosovo Agriculture and Rural Development Project is to improve the quality of processed food products and fresh produce to progressively meet EU standards. On page 78, the 2011 water study points out that "contaminated sources of water for irrigation are a health hazard which may generate difficulties for agricultural product commercialization. Food safety is a sensitive issue among people and media reports on disease linked to unhealthy irrigated food can be damaging for export."

Furthermore, on page 74 the 2011 Water Study states – "Due to the discharge of waste water from the mines and the two power plants, when flood events occur, the polluted water contaminates the soil close to the river bank which might affect the quality of the crops cultivated in these areas. The groundwater of the alluvial aquifer linked to the Sitnica River is also contaminated and the water from wells is improper for domestic use and even for irrigation."

- **The ESIA needs to be sure that water demand from the KRPP does not conflict with the goals of the Agriculture and Rural Development Strategy 2009-13, including increased income levels; improved quality standards; increased employment opportunities; and facilitated entry to the EU.**

- **The ESIA water study needs to determine how pollution, including water pollution, from coal production and combustion impact Kosovo meeting EU quality standards for its agricultural products**.

- **The ESIA needs to provide an analysis of the opportunity costs of the new coal plant, i.e., hectares of agricultural land that cannot be irrigated due to water used by KRPP.** Food prices and, consequently, farmland prices in Europe and specifically in the region have been increasing rapidly.[26]

[26] For example, in some regions of Poland farmland prices have gone up fourfold since Poland joined the EU - from €1,207 per hectare in 2004 to €4,500 per hectare in 2010. (Agra-net, November 2010. Farmland prices surge in Eastern Europe. November 19, 2010. http://www.agra-net.com/portal2/home.jsp?template=newsarticle&artid=20017827353&pubid=ag002 [as assessed on July 4, 2012]). In 2011, the average price per hectare in Romania was €1,972, up from €1,700 in 2010, €1,500 in 2009, and just €927 in 2007. (DTZ Echinox's 'Agricultural Land Investment Romania 2012')

Drinking Water Supply and Quality

The 2011 Water Study does not represent the full range of potential drinking water requirements. It uses mainly conservative assumptions for population growth, per capita consumption rates, and extension of connections.

Population growth: For the WEAP simulation, the population growth rate was taken to be 4% in 2010 and 1% in 2035 [pg. 125]. Looking at Tables 24 and 25 on page 125, it is noted that the WEAP model used the low population growth rate scenario. Thus, the WEAP simulation never did a high population growth rate scenario.

In addition to only representing low population growth, the 2011 Water Study does not consider potential differences in total population growth and urban population growth, i.e., the urban population needs to be connected to the IL canal water system.

In addition to general population growth trends, according to the 2011 Water Study, in 2013 the Gazivoda system is expected to make up for shortcomings in the Badovc reservoir:

> The Badovc reservoir under current conditions does not provide sufficient water resources to meet the demand from 35% of Prishtina city even under average precipitation conditions. Executive Summary Paragraph 13
>
> In 2010 bulk water shortage exists for the part of the town supplied by the Badovc Reservoir System…one project aims at supplying an additional 700 l/s through a water supply plant in Shkabaj taking water from the Ibër-Lepenc canal. [pg. 123]
>
> Plans exist for the water from the IL canal to be used for the production of drinking water to serve the population and other users of the towns of Mitrovica, Vushtrri and Prishtina. [pg.27]

- **The ESIA water study needs to account for the full range of expected increases in drinking water demand, including a complete range of population growth rates from high to low and migration trends. For example, where are jobs being created; where are people being resettled; etc…**

Per capita consumption: On page 102, the value chosen by the consultant team for the **WEAP baseline scenario is stated as 150 liters per capita per day (l/c/d)**, which "corresponds to a mean value used in similar towns in Europe." In addition, the 2011 Water Study states that:

> "It is important to keep in mind that consumption per capita is expected to be decreasing **(from 150 l/d in 2010 to 120 l/d in 2035**) due to tariff structure change as households can see an interest in reducing their consumption This supposes that the rate of the billed water improves. As a consequence, the household will be inclined to pay less and the average consumption will be reduced." [page 127]
>
> During the hot summer however the consumption will increase as people use more water in such circumstances. WEAP Model: For the dry year the consumption was set at **180**

l/c/d and for the very dry year at **200 l/c/d**. [pg. 127] (values selected by the Consultant team)

The WEAP model assumptions may be considered low for Kosovo. There are two consumption estimates provided in the study:

> "Drinking water supply via the Ibër-Lepenc System is reported to be based on a per capita consumption of **340 l/c/d**, including all leakages in distribution networks... The **future [Kosovo] consumption** strategies aim for a reduction to **200 l/c/d."** [pg. 102]

> "The average per capita consumption for 2008, which was calculated by dividing the total volumes invoiced by the population connected, gives respectively **135** litres per capita per day (l/c/d) for the Prishtina region and **182 l/c/d** for the Mitrovica region." [pg. 126]

The much lower Prishtina and Mitrovica estimates do not account for leakages in the distribution networks or non-revenue (non-billed) water consumption, which could explain the much higher figure of 340 l/c/d.

The WEAP model appears to only present a moderate to low scenario for consumption, which is a very uncertain outcome. Even the WEAP climate change scenarios, which are supposed to represent the worse possible case, do not use the Kosovo government's higher value of 340 l/c/d.

- **The ESIA water analysis should use at least three different scenarios: decreasing, stable, and increasing for per capita consumption rates.**

Extension of connections: The 2011 Water Study discusses issues surrounding the extension of connections, but does not account for it in the WEAP model simulations – on page 129 "For WEAP, for simplification purposes, a simple calculation was made: the population multiplied by per capita consumption."

The 2011 Water Study provides the following information:

> The Water National Strategy (WD 2006) set the objective of 80% of the population accessing to a public water supply system by 2013. On the other hand, the report WYG International on Prishtina regional water supply – 2009 indicates: —The percentage of population in the supply area obtaining water from piped water supply systems was, after discussions with the RWCP, estimated to increase from the existing level of 65% to around 88% by 2030. [pg. 125]

> In Prishtina, only 65.6 percent of the population is connected to the water system (Source: Report on the performance for 2008 from the water and waste regulatory office, Prishtina and Mitrovica Water Companies Directors). In Mitrovica, only 48.7 percent of the population is connected. [pg. 103]

- **The ESIA water study will need to account for the growth in piped water connections, which will have a significant impact on water demand from the Iber-Lepenc canal.**

Quality of Drinking Water – Heavily Polluted Groundwater – More Pipe Connections?

In addition to an increase in piped water connections in the already served urban areas, there may need to be expansions to some new villages due to highly polluted groundwater. The 2011 Water Study provides the following information:

> To achieve the objective of safe water supply, piped water supply systems need to be further expanded to increase the connection rates, and measures need to be taken towards groundwater pollution control. [Executive Summary, paragraph 18]
>
> Of the non-connected population, over 90% are supplied by water from shallow wells/boreholes, which are highly vulnerable to pollution (Source: the report WYG International on Prishtina regional water supply – 2009).
>
> The existing thermal power plants Kosovo A and B are causing a significant pollution pressure on the Sitnica River and on the groundwater surrounding Prishtina. [pg 29.]
>
> Other locations, especially remote villages, still have poor water supply and sanitation services. In the plain of the Ibër and Sitnica River many villages rely on shallow ground water which is often contaminated. Children often suffer from water related diseases in such cases as there are no alternative water sources. [pg. 42]
>
> Ongoing research conducted by Prishtinaa University shows, for example, that the waters flowing in the Ibër and Sitnica rivers are still heavily polluted by heavy metals. (*Source:* OSCE*)* [pg. 49]

It should be noted that heavy metals do not decompose. They remain in soil and continue to leach into water ways and in the sediments of rivers. It is also important to note that equipment required to reduce pollution in the air has increased harmful contaminants in water discharged by power plants, particularly heavy metals such as selenium, cadmium, mercury and lead.[27]

Thus far, none of the World Bank's project documents for the proposed Lignite Power Project address the significant impacts posed from mercury and lead contamination. The KRPP and mining operations only stand to exacerbate the already highly polluted groundwater and Sitnica River.

- **The ESIA water study will need to clearly determine whether or not extensions in the piped water will need to take place in order to supply safe drinking water to additional villages outside the locations currently served.**

- **The ESIA will need to clearly determine the additional pollution to groundwater and the Sitnica River from the proposed KRPP and mining operations, including all heavy metal pollution.**

[27] Quoting the US EPA in **Coal-fired power plants face tighter water rules. *Associated Press*, September 15, 2009. http://www.msnbc.msn.com/id/32862581/ns/us_news-environment/t/coal-fired-power-plants-face-tighter-water-rules/**

- **Cumulative Impacts: Given the project area already suffers from severe pollution, the ESIA needs to consider the additional project-associated surface water and groundwater pollution in the context of cumulative impacts (e.g., the current high concentration of heavy metals in soil and river sediments will increase and continue to leach into the water supply).**

Unsettled Transboundary Issues

The water in the Iber-Lepenc canal is abstracted from the Iber river, which rises in Montenegro and passes through Serbia, and, beyond the Gazivoda reservoir and its Iber-Lepenc canal in Kosovo, returns to Serbia and flows into the Morava and from there the Danube. The Iber-Lepenc canal runs south from the Gazivoda dam parallel to the Sitnica river, which in turn is a tributary to the downstream part of the Ibër and carries central Kosovo's polluted return flows back to Serbia.[28]

Under international legislation regarding transboundary watercourses, each riparian country of a watercourse should inform the authorities of the other countries, both upstream and downstream, of its intention to use additional water.

The 2011 Water Study puts forward the following unaddressed concerns:

> The countries downstream can request prior information and an assessment of the impact of any planned use of water. They can also call for a rational and equitable use of the water. For example, Serbia should normally be informed of the use of water for cooling the new Kosovo and its possible harmful impact, if any. [page 49]
>
> The requirements for prior notification of riparian countries on significant investments on the river are complicated since Serbia and other downstream riparians on the Ibër-Morava-Danube system do not recognize the Government of Kosovo. Specific legal advice will be needed for any measure which requires notification.[29] [page 99]
>
> The quality of the return and used waters that are collected in the Sitnica river is very poor. This presents potentially a threat for human health locally, and may become a source of conflict with the downstream riparian (Serbia). [Executive Summary, paragraph 19]

In addition, the water demand is uncertain both upstream and downstream from the Gazivoda reservoir. The 2011 Water Study (page 26) notes that "In 2011, a large quantity of the water from the [Gazivoda] reservoir has flown back to the Ibër river and to Serbia." Furthermore, the flow released downstream, which will include the proposed KRPP, will gain importance in the near future due to hydropower plans of Serbia. According to the 2011 Water Study – "The Serbian government plans to

[28] According to the 2011 Water Study: The Ibër River flows through the Gazivoda reservoir and dam that has an area of 11.9 km², of which 9.2 km² [77%] belongs to Kosovo and 2.7 km² [23%] to Serbia.

[29] The 2011 Water Study notes that "precedents exist in the post-Yugoslavia areas where the International Commission for the Protection of the Danube (and in other but similar cases, the International Sava Commission), have acted as facilitating intermediaries."

construct dams in the Ibër River Basin to produce hydropower. An agreement has been signed recently with Italian partners on this matter" (page 99).[30]

- **The ESIA will need to address significant transboundary concerns, including ensuring that Serbia and other downstream riparian countries are notified and consulted with according to international law and EU directives.**

- **The ESIA needs to include an assessment of the impact of planned water use and water discharges of the proposed KRPP and the mining operations on the water quality and water supply to Serbia.**

- **The ESIA water system model needs to account for water demand growth from upstream and downstream of the Gazivoda reservoir stemming from Serbia.**

[30] According to IL Canal Company's Technical Director, rules of operation of the Gazivoda system require the release of an Environmental Flow (E-flow) of 1,8 m3/s which correspond to a storage of approximately 60 million m3 per year out of the 370 million in the Gazivoda reservoir. [2011 Water Study, page 99] The 2011 Water Study states that "Environmental flow requirements have been estimated in a simple fashion and taken "off the top" when calculating water balances. [Executive Summary, paragraph 9]