

Energy Regulatory Office

Options for the Refurbishment of Kosovo A

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Prishtina
7 June 2005



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Legal Framework (i)

Law No. 2004/10 on Electricity

Article 8

“A producer with a power plant of installed capacity above 5 MW, which **exists and is operating** on the date of the promulgation of this Law (30/06/2004), shall be required to offer the electricity produced by such power plants to the public supplier at a regulated price if the public supplier needs the electricity.”

Legal Framework (ii)

Law No. 2004/8 on Energy

Article 15.3

“Prudent private investment in the energy sector of Kosovo shall be encouraged and favourable foreign investment and **energy buy-back** conditions shall be established for the purpose of attracting investment for the construction of new energy facilities and for the modernization, rehabilitation, and expansion of existing generation capacities, transmission and distribution systems.”

Facts

- (i) Increasing Energy **Balance Gap** till new “Kosovo C” comes into line, probably 2012
- (ii) Inability of KEK to **finance** new investments
- (iii) Assets cannot be sold but can be **leased** to investors
- (iv) Mining will remain with KEK implying “take or pay” **contracts** between KEK mining and the new enterprise

Terminology - Timing

- (i) **Rehabilitation** – partial (150 MW) to last 5-7 years
– 5000 hours/year – 2 tonnes/MWh – high O&M -
can be done by mid-2008 – CAPEX € 300/kW
- (ii) **Refurbishment** – full (200 MW) to last 10-15 years
– 7000 hours/year – 1.6 tonnes/MWh – lower O&M -
- can be done by mid-2009 – CAPEX € 700-
800/kW
- (iii) **Replacement** – new (300 MW) to last 25 years –
7800 hours/year – 1.3 tonnes/MWh – lower O&M -
can be done 2010-2011 – CAPEX € 1000/kW
- (iv) 11 Scenarios permutations on A5, A4, A3 –
decommissioning of A1, A2

Criteria

- (i) **Kosovo supply situation** (2 units required)
- (ii) **Investors needs** – Feronikelli 100 MW by mid-2006, Montenegro aluminium 60 MW?
An investment vehicle is probably too complex therefore 2 units will be required
- (iii) **“Kosovo C”** must not be threatened
- (iv) A5 will continue (emergency), till A4, and/or A3 are refurbished

Contractual Options

- (i) **Operated by KEK selling through PPAs to exporters/traders/eligible customers – KEK takes the physical risk on the asset and thus prejudices commercial separation between Kosovo A and B – “Article 8”**

- (ii) **KEK operates the “leased” asset under “Management Contract” – Lessee takes the physical risk but KEK may incur penalty. KEK sells the lignite to the third party and takes the physical risk of non-delivery (leasing out mining assets is improbable)**

Financial Options (i)

- (i) **KEK borrows** to rehabilitate against future sales by PPA. Risks: KEK unable to borrow, Article 8

- (ii) The **Third Party puts up the Financing** in exchange for a **lease of asset(s)** and has full dispatch rights. The third party gets revenue from some or all of the following:

Financial Options (ii)

- a. **Export** of energy
- b. **Sale agreement** for delivery of energy to the **public supplier** at the regulated price (this may be using KEK Generation as an intermediary; risk that the regulated price could dip below cost; an investor would consider this regulatory risk when appraising the investment.
- c. **PPA with KEK Supply** under unregulated prices (depending on its classification as a new or existing plant). If classified as a new plant then a 5-year PPA agreement with KEK Supply could be agreed at an unregulated price. The generator would bear the risk that there would be no buyer for the output after the five years. Presumably it will be possible to sell to the public supplier at a regulated price after the five years but this is not guaranteed and the regulated price may be too low.
- d. **PPA with KEK Generation** under unregulated prices (depending on its classification as a new or existing plant) could be for 15 years
- e. Sale of **Ancillary Services or Short-term contracts**

Financial Options (iii)

- (iii) A special purpose **investment company** is set up that pools investment from the different interested parties and puts up the financing for the rehabilitated plant in exchange for a lease of the assets and has full dispatch rights. The third party gets revenue from the same sources as an individual third party.

Teesside Power, which gave **slices of dispatch rights** to several different investors. It is a complex financial structure but it shares the equity risk between several interested parties and gives them the amount of power they require. Individual parties would get dispatch rights within ranges and would be separate contracting parties in terms of usage of the energy or of ability to trade it on. In this option, PPAs could be struck with KEK Supply by the individual investors. **KEK Generation could take a stake** and have some dispatch rights in proportion to its investments. Assumption that it is not bound to offer all power to the public supplier.

Tendering Options (i)

1. Rehabilitation/Refurbishment **specification**:
 - a. Minimum specification for rehab. for [5] years extra life
 - b. Comprehensive refurbishment (15 year lifespan)
 - c. New plant (lifespan of 25 years)

2. Guarantees of **delivery to KEK Supply**
 - a. All energy under PPA to KEK supply (max 5 years); or
 - b. Surplus energy only to KEK supply at the regulated price;
or
 - c. Surplus energy only to KEK [Generation?] under PPA at unregulated price

3. Guarantees of allowed **delivery to eligible customers/exports**

Tendering Options (ii)

4. Open **Tender or Authorisation** (Articles 38 and 39 “Energy Regulator). Tendering is Comparison, Authorisation ERO must devise a standard that must be met. In tendering, there is more control over the investment standard to be met. The time saved from Authorisation should not be exaggerated.
5. A Tender **must** have more than one respondent in its initial phases.

Tendering Authority

1. KEK
2. KTA
3. ERO
4. MEM

If a special purpose investment company is set up then maybe the procedure should be **by authorisation**, but with the criteria set by ERO (Article 30.2 of the Law on the Energy Regulator) explicitly set down.

Merita



Scenarios for Power & Balance (i)

	Annual Data					Peak data				
	2004 actual	without load shed	2005	2010	2015	2004 actual	without load shed	2005	2010	2015
	GWh/year					MW				
Demand	4,118.5	4,510.7	3,769.4	4,987.9	6,518.5	811	980	796	1,061	1,424
Security margin								330	330	330
Total								1,126	1,391	1,754
Generation										
Ujmani	115.6	115.6	115.6	115.6	115.6	32	32	32	32	32
Kosovo B	2,585.3	2,585.3	2,585.3	2,585.3	2,585.3	500	500	500	500	500
Imports	442.5	834.7				332	332			
Kosovo A	975.1	975.1	519.2	519.2	519.2		125	125	125	125
Scenario 1 = minimal refurbishment of A3 (with 5000 hours running)										
Demand			3,769.4	4,987.9	6,518.5			796	1,061	1,424
Demand +Security margin			3,769.4	4,987.9	6,518.5			1,126	1,391	1,754
Existing generation			2,700.9	2,700.9	2,700.9			532	532	532
A3			-	750.0	750.0			-	150	150
A4			-	-	-			-	-	-
A5			519.2	519.2	519.2			125	125	125
Reserved for export			-	525.6	525.6			-	60	60
Shortfall			549.3	1,543.4	3,074.0			469	644	1,007
Scenario 2 = minimal refurbishment of A3+A4 (with 5000 hours running)										
Demand			3,769.4	4,987.9	6,518.5			796	1,061	1,424
Demand +Security margin			3,769.4	4,987.9	6,518.5			1,126	1,391	1,754
Existing generation			2,700.9	2,700.9	2,700.9			532	532	532
A3			-	750.0	750.0			-	150	150
A4			-	750.0	750.0			-	150	150
A5			519.2	519.2	519.2			125	125	125
Reserved for export			-	525.6	525.6			-	60	60
Shortfall			549.3	793.4	2,324.0			469	494	857
Scenario 3 = minimal refurbishment of A3, A4 and A5 (with 5000 hours running)										
Demand			3,769.4	4,987.9	6,518.5			796	1,061	1,424
Demand +Security margin			3,769.4	4,987.9	6,518.5			1,126	1,391	1,754
Existing generation			2,700.9	2,700.9	2,700.9			532	532	532
A3			-	750.0	750.0			-	150	150
A4			-	750.0	750.0			-	150	150
A5			519.2	519.2	519.2			125	125	125
Reserved for export			-	525.6	525.6			-	60	60
Shortfall			549.3	1,312.6	2,093.2			469	619	832
Scenario 4 = full refurbishment of A3 (with 7000 hours running)										
Demand			3,769.4	4,987.9	6,518.5			796	1,061	1,424
Demand +Security margin			3,769.4	4,987.9	6,518.5			1,126	1,391	1,754
Existing generation			2,700.9	2,700.9	2,700.9			532	532	532
A3			-	1,400.0	1,400.0			-	200	200
A4			-	-	-			-	-	-
A5			519.2	519.2	519.2			125	125	125
Reserved for export			-	525.6	525.6			-	60	60
Shortfall			549.3	893.4	2,424.0			469	594	957
Scenario 5 = full refurbishment of A3 (with 7000 hours running), minimal on A4 (5000 hours running)										
Demand			3,769.4	4,987.9	6,518.5			796	1,061	1,424
Demand +Security margin			3,769.4	4,987.9	6,518.5			1,126	1,391	1,754
Existing generation			2,700.9	2,700.9	2,700.9			532	532	532
A3			-	1,400.0	1,400.0			-	200	200
A4			-	750.0	750.0			-	150	150
A5			519.2	519.2	519.2			125	125	125
Reserved for export			-	525.6	525.6			-	60	60
Shortfall			549.3	143.4	1,674.0			469	444	807

Scenarios for Power & Balance (ii)

	Annual Data					Peak data				
	2004 actual	without load shed	2005	2010	2015	2004 actual	without load shed	2005	2010	2015
	GWh/year					MW				
Scenario 6 = full refurbishment of A3 (with 7000 hours running), minimal on A4, A5 (5000 hours running)										
Demand			3,769.4	4,987.9	6,518.5			796	1,061	1,424
Demand +Security margin			3,769.4	4,987.9	6,518.5			1,126	1,391	1,754
Existing generation			2,700.9	2,700.9	2,700.9			532	532	532
A3			-	1,500.0	1,500.0			-	200	200
A4			-	750.0	750.0			-	150	150
A5			519.2	-	750.0			125	-	150
Reserved for export			-	525.6	525.6			-	60	60
Shortfall			549.3	562.6	1,343.2			469	569	782
Scenario 7 = full refurbishment of A3, A4 (with 7000 hours running)										
Demand			3,769.4	4,987.9	6,518.5			796	1,061	1,424
Demand +Security margin			3,769.4	4,987.9	6,518.5			1,126	1,391	1,754
Existing generation			2,700.9	2,700.9	2,700.9			532	532	532
A3			-	1,400.0	1,400.0			-	200	200
A4			-	1,400.0	1,400.0			-	200	200
A5			519.2	519.2	519.2			125	125	125
Reserved for export			-	525.6	525.6			-	60	60
Shortfall			549.3	506.6	1,024.0			469	394	757
Scenario 8 = full refurbishment of A3, A4 (with 7000 hours running), minimal on A5 (5000 hours run time)										
Demand			3,769.4	4,987.9	6,518.5			796	1,061	1,424
Demand +Security margin			3,769.4	4,987.9	6,518.5			1,126	1,391	1,754
Existing generation			2,700.9	2,700.9	2,700.9			532	532	532
A3			-	1,400.0	1,400.0			-	200	200
A4			-	1,400.0	1,400.0			-	200	200
A5			519.2	-	750.0			125	-	150
Reserved for export			-	525.6	525.6			-	60	60
Shortfall			549.3	12.6	793.2			469	519	732
Scenario 9 = full refurbishment of A3, A4, A5 (with 7000 hours running)										
Demand			3,769.4	4,987.9	6,518.5			796	1,061	1,424
Demand +Security margin			3,769.4	4,987.9	6,518.5			1,126	1,391	1,754
Existing generation			2,700.9	2,700.9	2,700.9			532	532	532
A3			-	1,400.0	1,400.0			-	200	200
A4			-	1,400.0	1,400.0			-	200	200
A5			519.2	-	1,400.0			125	-	200
Reserved for export			-	525.6	525.6			-	60	60
Shortfall			549.3	12.6	143.2			469	519	682
Scenario 10 = New Unit replaces A3 and A4 (with 7800 hours running), A5 (with 5000 hours running)										
Demand			3,769.4	4,987.9	6,518.5			796	1,061	1,424
Demand +Security margin			3,769.4	4,987.9	6,518.5			1,126	1,391	1,754
Existing generation			2,700.9	2,700.9	2,700.9			532	532	532
New unit			-	-	2,340.0			-	-	300
A4			-	-	-			-	-	-
A5			519.2	519.2	519.2			125	125	125
Reserved for export			-	525.6	525.6			-	60	60
Shortfall			549.3	2,293.4	1,484.0			469	794	857
Scenario 11 = New Units replaces A3 and A4 (with 7800 hours running), A5 (with 5000 hours running)										
Demand			3,769.4	4,987.9	6,518.5			796	1,061	1,424
Demand +Security margin			3,769.4	4,987.9	6,518.5			1,126	1,391	1,754
Existing generation			2,700.9	2,700.9	2,700.9			532	532	532
New unit			-	-	2,340.0			-	-	300
New unit			-	-	2,340.0			-	-	300
A5			519.2	519.2	519.2			125	125	125
Reserved for export			-	525.6	525.6			-	60	60
Shortfall			549.3	2,293.4	856.0			469	794	557



Key Issues

- 1. Feronikelli 100 MW – (Montenegro 60 MW?) – High LF**
- 2. Improve Security of Supply (Power Balance)**
- 3. Cost of Power to KEK Supply**
- 4. Not prejudice Kosovo C**
- 5. Viability of the option from the investor point of view**
- 6. Speed of development and risk of delay**

Assumptions on Mining (i)

		Annual data	Cumulative
Kosovo B	GWh	2,585.3	
	tonnes/MWh	1.60	
	million tonnes/yr	4.14	4.14
Kosovo A5	GWh	519.2	
	tonnes/MWh	1.85	
	million tonnes/yr	0.96	5.10
Refurbished A3	GWh	1,500.0	
	tonnes/MWh	1.67	
	million tonnes/yr	2.50	7.59
Refurbished A4	GWh	1,500.0	
	tonnes/MWh	1.67	
	million tonnes/yr	2.50	10.09

Assumptions on Mining (ii)

Refurbished of equipment		
Investment cost	€m	10
Amortisation period	years	15
Amortisation rate		12%
Additional output	m tonnes/yr	3.50
Annual cost	€m	1.31
Unit cost	€/tonne	0.37
Field D development		
Investment cost	€m	20
Amortisation period	years	40
Amortisation rate		12%
Additional output	m tonnes/yr	10.00
Annual cost	€m	2.17
Unit cost	€/tonne	0.22

Estimated Costs of the different options

Financial Model of Investment Options				
		Partial Refurbish- ment	Full Refurbish- ment	New build
Physical				
MW		150	200	300
Hours of operation		5,000	7,000	7,800
Efficiency (tonnes/MWh) ¹		1.85	1.67	1.30
Years of operation		7	15	25
Discount rate		12%	12%	12%
Generation	<i>GWh</i>	750	1,400	2,340
Costs				
CAPEX	<i>€/kW</i>	300.00	750.00	1,013.00
Fixed O&M ²	<i>€/kW</i>	36.67	36.00	36.00
Variable O&M ²	<i>€/MWh</i>	1.30	1.70	1.70
Fuel ³	<i>€/tonne</i>	8.25	8.25	8.25
Fixed cost				
CAPEX	<i>€/kW/yr</i>	58.69	98.32	115.32
Fixed O&M	<i>€/kW/yr</i>	36.67	36.00	36.00
Total	<i>€/kW/yr</i>	95.36	134.32	151.32
	<i>€/m/year</i>	14.30	26.86	45.40
	<i>€/MWh</i>	19.07	19.19	19.40
Variable cost				
Fuel	<i>€/MWh</i>	15.26	13.74	10.73
O&M	<i>€/MWh</i>	1.30	1.70	1.70
Total	<i>€/MWh</i>	16.56	15.44	12.43
Total cost	<i>€/MWh</i>	35.63	34.62	31.82

¹ Source: KEK (GIS for new build)

² Source: ESTAP 1, GIS

³ Source KEK

Conclusions

Scenarios 7 and 8 (Refurbishment of A3 and A4) by 2010 as well as Rehabilitation of A5 after 2010

Authorisation Procedures (negotiation with potential investors – call for expression of interest – 3 months time)