### BOSNIA AND HERZEGOVINA GOVERNMENT OF FEDERATION OF B&H Federal Ministry of energy, mining and industry

# CONSTRUCTION OF POWER PLANTS IN FEDERATION OF B&H

# CATALOGUE OF POWER PLANTS

PRIORITIES

March 2010

### **GENERAL CONTENTS**

PE Elektroprivreda BiH d.d., Sarajevo PE Elektroprivreda HZHB d.d., Mostar M&TPP Banovići, Banovići Other projects



### Javno preduzeće ELEKTROPRIVREDA BOSNE I HERCEGOVINE d.d. - Sarajevo

# CONSTRUCTION PRIORITIES OF POWER PLANTS

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### **COMPANY PROFILE**

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- Public enterprise Elektroprivreda BiH, d.d. Sarajevo (PE EP BiH) is a company for power generation, distribution and supply.
- PE EP BiH was founded on August 30, 1945 by Act of People's Government of B&H and it operates as a joint stock company today.

- The capital of company is 2.155 billion KM and it consists of 90 % of state capital and 10% of private share capital.
- PE EP BiH operates with two thermal power plants (TPP Tuzla and TPP Kakanj) with total installed capacity of 1,165 MW and three hydropower plants (HPP Jablanica, HPP Grabovica and HPP Salakovac) with installed capacity of 517 MW.
- Total power generation in 2009 was 6,661 GWh and consumption was 4,095 GWh. The export was 2,566 GWh.
- The company supplies energy for 688,514 customers and employs 4,975 of high qualified employees.
- Our target is to construct new, modern thermal power plants to substitute our old units.
- We are also focused on construction of new hydro and wind energy facilities in order to increase generation capacities from renewable sources.

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### TPP Tuzla; Unit 7 - 450 MW

1		Object name	Unit 7, 450 MW –TPP Tuzla			
			Location Existing location of Them Plant Tuzla			of Thermal Power Tuzla
			Type TPP- Cogeneration L pulverized coal burning critical paramete 275/56 bar; 600/61		ation Unit with ourning and ultra arameters 600/610 °C	
2		Basic Parameters	Fuel	Coal- lig consum	Coal- lignite H <sub>d</sub> = 9500 KJ/kg; consumption approx. 2.3 mill t/yea	
			Installed electric power (netto)		450	MWe
			Installed Thermal power		320	VIW <sub>th</sub>
		1	Efficiency in condensing mode		42.7	′5 %
				N	O <sub>x</sub>	<200 mg/Nm <sup>3</sup>
			Emission Limit values	S	O <sub>2</sub>	<200 mg/Nm <sup>3</sup>
				Dı	ust	<30 mg/Nm <sup>3</sup>
3	Goals and e of	xpected effects of oject construction	<ul> <li>Securing continuity of production of electrical and heat energy</li> <li>Reduction of emission and fulfilling obligations concerning the establishment of the power market of South-East Europe</li> <li>Increasing of energy efficiency.</li> </ul>			d heat energy oncerning the st Europe
4		Estimated costs	Total investment cost (milion of €) (which relates to TPP and mine) 84			841.60
	Actual status	Obtaining approvals of authorities	R equest for Environment approval submitted to authorities. Request for Preliminary water approval submitted to authorities.			es. orities.
5	of preparing activities	Preparing of investment- technical documentation	Preliminary design completed. Environmental impact assessment completed.			
6	Plan	of realisation with	According to long term energy supplementation	oly plan til	l 2030. of	JP EP B&H, it is

#### TPP Tuzla

#### **PERIOD OF PROJECT IMPLEMENTATION : 6 years**

Staff hired during construction:

Indirect	4000
Direct	2500
Total	6500
New jobs (operation and mainta	ance):
Mine	900
Thermal power plant	265
Total	1165

Start of construction in mid 2012, year and ending in 2017.

#### - KAKANJ"

"KAKANJ" (TE KAKANJ) RUEKE D NE, 5 KIN UZVODNO OD G ZENICE 1 40 KG SJEVERNO OO SARAJEVA HAGA TERM CELEXTRANE JE STE MA



#### **TPP Kakanj**

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#### **PERIOD OF PROJECT IMPLEMENTATION : 5 years**

Staff hired during construction:

Indirect	2500
Direct	1500
Total	. 4000

New jobs (operation and maintance):

Mine8	00
Thermal power plant1	88
Total9	88

### TPP Kakanj; Unit 8- 300 MW

1		Object name	Unit 8, 300 MW –TPP Kakanj			
		·	Location	At the existing location of The power plant Kakanj		ition of Thermal j
			Туре	TPP-Cog or pulver ctitical pa	unit with CFB burning and sub 167 bar;566 C	
		Basic Parameters	Fuel	Brown co Consum	Brown coal H <sub>d</sub> = 12.874 KJ/kg; Consumption cca 1,4 mil. t/year	
2			Installed electric power (netto)		300 N	1W <sub>e</sub>
			Installed Thermal power		300 M	IW <sub>th</sub>
			Efficiency in condensing mode		39 (	%
				N	O <sub>x</sub>	<200 mg/Nm <sup>3</sup>
			Emission Limit values	S	<b>D</b> <sub>2</sub>	<400 mg/Nm <sup>3</sup>
		•		Du	ust	<30 mg/Nm <sup>3</sup>
3	Goals and e ot	xpected effects of oject construction	<ul> <li>Securing continuity of production of electrical and heat energy</li> <li>Reduction of emission and fulfilling obligations concerning the establishment of the power market of South-East Europe</li> <li>Increasing of energy efficiency</li> <li>Achieving higher share of combined production of electrical and heat energy</li> </ul>			
4		Estimated costs	Total investment cost (milion of €) (which relates to TPP and mine)			681.00
	Actual status	Obtaining approvals of authorities				
5	of preparing	Preparing of				
	activities	investment-	t- Preliminary design completed.			
		technical	cal Environmental impact assessment completed.			
	Plan	of realisation with	uith Asserting to long term operative supply plan till 2020, of ID ED D&LL it is			
6	Pidilo	investment plan estimated for Unit 7 to be in operation in 2018				
	investigation of the line of t					

Start of construction in mid 2013, and ending in 2017.

### TPP Kakanj; Combined Cycle-100 MW

1		Object name TPP Kakanj – Gas Turbine Combined Cycle (GTCC) - 100 MW			C) - 100 MW	
			Location	At the	e existing l Kak	ocation of TPP
i i			Туре	GTCC		CC
[			Fuel	Natural gas H <sub>d</sub> =33. 380 kJ/Nm <sup>3</sup>		-33. 380 kJ/Nm <sup>3</sup>
			Installed electric power (netto)		100 MW <sub>e</sub>	
		Basic Parameters	Installed Thermal power	60 MW <sub>t</sub>		MW <sub>t</sub>
2		Dasie i arameters	Efficiency in condensing mode		47	%
				N	O <sub>x</sub>	<100 g/MWh
			Emission Limit values	S	O <sub>2</sub>	Venial emission with natural gas
		•		du	ıst	Venial emission with natural gas
3	3 Goals and expected effects of object construction		<ul> <li>Achieving of favorable fuel mix</li> <li>Increase value of thermal power plant by supplying of peak energy and rotatig reserve</li> <li>Increasing security of supply and adaptation to liberised power market</li> </ul>			
4	Estimated costs		Total investment cost (milion of €) Present estimation of investment 100 MW is approx. 1000 Euro/kW	in Unit-		100.00
	Actual status	Obtaining approvals of authorities				
5	of preparing activities	preparing Preparing of activities investment- technical documentation		progress.		
6	Plan o	of realisation with investment plan	According to preliminary data for capacity in BiH, construction comple 2020.	planned etion and	developm commisior	ent of generation hing is planned in
* E	* Depending of necessity of EES, this plant could be constructed till 2016.					



#### TPP Kakanj, Combined Cycle

#### PERIOD OF PROJECT IMPLEMENTATION :4 years

Staff hired during construction:

New

Indirect	1500
Direct	500
Total	2000
jobs (operation and	d maintance):

Total......100

10



### M & TPP Bugojno; Unit 1- 300 MW

1		Object name	Unit 1, 300 MW –TPP Bugojno			
			Location	Location Municipality of Bugojno, near coal mine Kotezi		
			Туре	TPP-Cogeneration unit with coal burning		
			Fuel	Coa	Coal-lignite H <sub>d</sub> = 10.600 KJ/kg	
2	1	Basic Parameters	Installed electric power (netto)		cca 300 MW <sub>e</sub>	
<b>1</b>			Installed Thermal power		cca 30	0 MW <sub>th</sub>
			Efficiency in condensing mode		4(	) %
				N	O <sub>x</sub>	<200 mg/Nm <sup>3</sup>
			Emission Limit values	S	O <sub>2</sub>	<200 mg/Nm <sup>3</sup>
		•		Du	ust	<30 mg/Nm°
3	Goals and ex ob	spected effects of ject construction	<ul> <li>Achieving of higher efficiency and higher share of combined production of heat and electric energy</li> <li>Increased security of supply and adaptation to conditions of liberised power market</li> <li>District heating of Bugojno, Donji Vakuf and Gornji Vakuf-Uskoplje</li> </ul>			of combined onditions of nji Vakuf-Uskoplje
4		Estimated costs	s Total investment cost (milion of €) (which relates to TPP and mine)		584.00	
	Actual status	Obtaining approvals of authorities				
5	of preparing activities	Preparing of investment- technical documentation	f Feasibility study for Mine and TPP completed.			
6	Plan o	Plan of realisation with investment plan         According to long term energy supply plan till 2030. of JP EP B&H, it i estimated for Unit 1 to be in operation in 2022.			JP EP B&H, it is	

#### •Mine and TPP Bugojno

#### **PERIOD OF PROJECT IMPLEMENTATION : 6 years**

Staff hired during construction:

Indirect	5500
Direct	2500
Total	. 8000
New jobs (operation and maintane	ce):
Mine	800
Thermal power plant	188
Total	988

Start of construction in 2017. and ending in 2022.



### **HPP Ustikolina**

#### HPP\_Ustikolina

#### **PERIOD OF PROJECT IMPLEMENTATION: 5 years**

Indirect	750
Direct	250
Total	

New jobs (operation and maintance): Total.....40

1		Object Name		HPP Ustikolina / Ustikolina - Goražde							
			Location			U	stikolina, Drina	river "			
2	Basic Parameters		Туре			Run-c	of-river, plant ins	side dam	1		
			Installed powe	r (P <sub>i</sub> )			3×21.2=63.6 M	W			
			Total electricity (E <sub>g</sub> )	Total electricity generation per year (E <sub>n</sub> )			255 GWh		Pl		
3	Goals and e ol	xpected effects of bject construction	Water resources utilization and increase in hydropower production capacity, increase in stability of electricity supply in the region. Increase in percentage of participation of electricity production from renewable energy resources, contribution to the total decreasing in CO <sub>2</sub> NO, emissions								
			Total Investm	ent Costs (mill	ion of €)			92.2			
	Estimated cost	s and structure of	Civil Works				39.2				
4	investment		Equipment				50.6				
			Other costs				2.4				
	Current status	Obtaining approvals from authorities	Preliminary wa	ater approval obt	ained.				1		
5       of preparatory activities       Preparing of investment-technical documentation       Preliminary environmental impact assessment will be completed till the end of august 2010.					completed till thugust 2010.	ne end of					
6	Planned invest	ments throughout	2011.	2012.	20	13.	2014.	2015.			
0	years (million of €)		15.0	25.0	2	5.0	17.2	10.0			
7	7 Start of construction		Beginning of 2	011.							



### HPP Vranduk

1		Object Name		HP	P Vranduk / Z	enica				
$\square$			Location	Location Vranduk, Bosna river			na river			
2	E	Basic Parameters	Installed Powe	r (P <sub>i</sub> )		2×9.12 + 1.32 =	19.56 MW			
			Total Electricit (E₀)	y Generation pe	er Year	86.88 + 9.50 = 9	6.38 GWh			
3	Goals and ex ob	pected effects of ject construction	Water resources utilization and increase in hydropower production capacity, increase in stability of electricity supply in the region. Increase in percentage of participation of electricity production from renewable energy resources, contribution to the total decreasing in $CO_2$ , $NO_2$ emissions					Staff hired during co		
4 Estimated costs and structure of			Total Investment Costs (million of €)47.6Civil Works27.4Equipment16.3			Direct <u></u> Total				
			Other costs 3				3.9			
5	Actual status	Obtaining approvals from authorities	Preliminary wa obtained.	ter approval and	d approval for o	concession of Zeni	ica municipality	New jobs (operation a Total		
5	activities	Preparing of investment- technical documentation	Preliminary design and Environmental impact assessment will be finished till the end of April 2010.							
6	Planned investm	nents throughout	2010.	2011.	2012.	2013.	2014.			
7	yea Star	t of construction	7.1 Middle of 2010	11.9	9.5	11.9	7.2	4		
								4		

#### EMENTATION: 5 years

nstruction:

Indirect	
Direct	200
Total	800

nd maintance): ......20



HPP	Unac

1		Object Name		HPF	P Unac/Martin Br	od		J .
	2 Basic Parameters		Location		N	Aartin Brod, Una	c river	HPP Unac
			Туре		Accu	Accumulation, plant inside dam		
2			Installed powe	r Pi		2× 36.8 = 73.6	MW	
			Total Electricit Year (Eg)	Total Electricity Generation per 259 GWh			PERIOD OF PROJECT IMPLEMENTATION: 5 years	
3	Goals and ex	xpected effects of	Water resourc increase in sta	es utilization an ability of electricity	tilization and increase in hydropower production capacity, y of electricity supply in the region. Increase in percentage			Otoff, kins d duning a constructions
	01	Ject construction	contribution to	the total decrea	sing in CO <sub>2</sub> NO.	enewable energ	Jy resources,	Staff nired during construction:
			Total Investment Costs (million of $\pounds$ ) 87.0		Indirect600			
	Estimated costs and structure of		Civil Works	Civil Works 51.4		Direct 200		
4		investment	ent Equipment 25.9					
			Other costs		9.7		l otal800	
		Obtaining						
		approvals from						New jobs (operation and maintance).
	Current status	authorities						
5	of preparatory activities	Preparing of investment- technical documentation	Feasibility stud Geological inve	dy HPP Rmanj M estigation, I pha	1anastir, 1986. se, 1989.		_	l otal
6	Planned invest	ments throughout	l year	II year	III year	IV year	V year	
Ľ	ye	ears (million of €)	13.0	15.0	17.4	25.0	16.6	
7	Sta	rt of construction	To be determin	ned.				

### HPP Kruševo & HPP Zeleni Vir



1		Object Name	HPP Kruševo & HPP Zeleni Vir/ Olovo					
			Location		Olovo	, Bioštica river ··		
	Basic Parameters		Type of HPP Kru	Type of HPP Kruševo Acumu				
2			Type of HPP Zel	leni Vir	Pla	nt inside dam		
-			Installed Power	(P <sub>i</sub> )	9.7	75+2.13 MW		
			Total Electricity (E <sub>q</sub> )	Generation per Yea	21.	72+8.40GWh		
			Water resources	s utilization and incre	ease in hydropowei	production capacity,		
3	Goals and ex	cpected effects of	increase in stabi	ility of electricity sup	ply in the region. In	crease in percentage		
Ŭ	ob	ject construction	of participation	of electricity produc	tion from renewab	le energy resources,		
			contribution to th	e total decreasing in	CO <sub>2</sub> , NO <sub>x</sub> emission	1S,		
			Total Investmer	nt Costs (million of	€)	46.60		
4	Estimated costs	s and structure of	Civil Works	27.03				
		investment	Equipment	16.31				
			Other costs	3.26				
		Obtaining						
	0	approvals from						
_	Current status	authorities						
5	activities	invostmont						
	activities	tochnical	Study of hydropotential of Bioštica river finished.					
		documentation						
6	Planned investr	nents throughout	2012.	2013.	2014.	2015.		
0	ye	ars (million of €)	7.0	11.65	12.80	15.15		
7	Sta	rt of construction	2011/2012					

#### Bioštica river

#### **PERIOD OF PROJECT IMPLEMENTATION: 4 years**

Staff hired during construction:

Indirect	450
Direct	150
Total	600

New jobs (operatio	n and maintance):
Total	



### HPP Vrhpolje

1		Object Name	HPP Vrhpolje / Sanski Most					
			Location			Vrhpo	olje, Sana riv	/er
		Туре	Type Peak, plant inside dam					
2		Basic Parameters				2x37	+5.4=79.4 M	W "
-			Total El	ectricity Gener	ation per	1	157 5 GWb	
			Year (Eg	)			107.0 OWN	
			HPP Vrh	polje and HPI	P Caplje are ur	nique project.		
			Water re	sources utiliza	ation and increa	ase in hydropov	ver productio	n capacity,
			increase	in stability of	electricity supp	ly in the region.	Increase in I	percentage
3	Goals and e	xpected effects of	of partic	ipation of electron	ctricity product	ion from renew	able energy	resources,
	01	oject construction	contribution to the total decreasing in $CO_2$ , $NO_x$ emissions, Peak HPP wi				K HPP with	
			fishing t	i now regulat		be used for i		ingation,
			Total In	vestment Cos	ts (million of f	E)		151.8
	Estimated cost	e and structure of	Civil Works 62.1					
4	LStimated Cost	investment	Equipment				38.9	
		investment	Other costs				<u> </u>	
		Obtaining		515			1	50.8
		approvals from						
	Current status	authorities						
5	of preparatory	Preparing of	of					
	activities	investment-						
		technical	Preliminary design - I phase is finished.					
		documentation						
6	Planned investr	nents throughout	2011.	2012.	2013.	2014.	2015.	2016
0	y	ears (million of €)	4.5	25.8	29.0	29.0	40.0	23.5
7	Sta	rt of construction	Beginnir	ng of 2012.				

#### HPP Vrhpolje

#### **PERIOD OF PROJECT IMPLEMENTATION: 5 years**

Staff hired during construction:

Indirect	1200
Direct	300
Total	1500

New jobs (operation and maintance): Total......60



# HPP Ĉaplje

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#### **PERIOD OF PROJECT IMPLEMENTATION: 4 years**

Staff hired during construction:

Indirect	300
Direct	100
Total	400

New jobs (operation and maintance):
Total15

1		Object Name	HPP Čaplje / Sanski Most				· ·	
			Location			<ul> <li>Čaplje</li> </ul>	e, Sana r	iver · ·
			Туре			Compensation for HPP Vrhpolje, "		
	Basic Parameters		турс			plant	inside da	am
2			Installed Pov	ver (P <sub>i</sub> )		3x4=12 MW		
			Total Electri Year (E <sub>g</sub> )	city Generatio	n per	56	8.8 GWh	
			HPP Vrhpolj	e and HPP Ča	aplje are unic	ue project.		
3	Goals and e of	xpected effects of oject construction	Water resources utilization and increase in hydropower production capacity, increase in stability of electricity supply in the region. Increase in percentage of participation of electricity production from renewable energy resources, contribution to the total decreasing in CO <sub>2</sub> , NO <sub>x</sub> emissions, Peak HPP with seasonal flow regulation, it should be used for flood control, irrigation, fishing, tourism					tion capacity, in percentage gy resources, eak HPP with rol, irrigation,
			Total Investment Costs (million of €) 23.0					
	Estimated cost	s and structure of	Civil Works 1				13.2	
4			Equipment 7.9					
4		investment	Equipment					7.9
4		investment	Other costs					7.9 1.9
4	Current status	Obtaining approvals from authorities	Other costs					7.9 1.9
5	Current status of preparatory	Obtaining approvals from authorities Preparing of	Other costs					7.9
5	Current status of preparatory activities	Obtaining approvals from authorities Preparing of investment- technical	Other costs	design – I phas	se finished.			7.9
5	Current status of preparatory activities	Obtaining approvals from authorities Preparing of investment- technical documentation	Other costs	design – I phas	se finished.			7.9 1.9
5	Current status of preparatory activities Planned investo	Obtaining approvals from authorities Preparing of investment- technical documentation ments throughout	Preliminary of 2011.	design – I phas 2012.	se finished. 2013.	2014	ł.	7.9 1.9 2015.
4 5 6	Current status of preparatory activities Planned investa	Obtaining approvals from authorities Preparing of investment- technical documentation ments throughout ears (million of €)	Preliminary of 2011.	design – I phas 2012. <b>4.6</b>	se finished. 2013. <b>4.6</b>	2014 6.9	4.	7.9 1.9 2015. <b>4.0</b>



### **HPP** Vinac

1		Object Name	HPP Vinac / Jajce				
			Location Vinac, Vi			/rbas river	
			Type Run - of			of - river	1
2	2 Basic Parameters		Installed Power	(P <sub>i</sub> )	11.5	5 MW	1
			Total Electricity Year (E <sub>g</sub> )	Generation per	61.3	GWh	PI
2	Goals and e	xpected effects of	Water resource	s utilization and	increase in hydrop	power production	1
3	0	bject construction	capacity, increas	se in stability of elec	tricity supply in the	region.	
4			Total Investme	nt Costs (million o	f€)	25.1	
	Estimated costs and structure of investment		Civil Works			14.4	
			Equipment			8.6	]
			Other costs	2.1	]		
	Current status	Obtaining approvals from authorities					
5	of preparatory activities	Preparing of investment- technical documentation	Study of hydropo	otential of Vrbas rive	er finished.		
6	Planned invest	ments throughout	2012.	2013.	2014.	2015.	
Ľ	yea	rs (million of €)	7.5	5.1	5.1	7.4	
7	Sta	art of construction	2011/2012				

HPP Vinac

#### PERIOD OF PROJECT IMPLEMENTATION: 4 years

Staff hired during construction:

Indirect	300
Direct	100
Total	400

New jobs (operation and maintance):

Total.....15

Design solutions for HPP Vinac and HPP Babino Selo are unified.

HPP Babino Selo / Donji Vakuf



#### HPP Babino Selo

PERIOD OF PROJECT IMPLEMENTATION: 4 ye	ars
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Staff hi	red di	uring	construction:
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Indirect	300
Direct	100
Total	400

Total.....15

ŀ	<b>IPP</b>	Babi	no	Sel	0

Object Name

1

			Location		Donji Vakuf	, Vrbas river	
			Туре		Run-o	of river	
2		Basic Parameters	Installed Power (	P <sub>i</sub> )	11.5	5 MW	1
			Total Electricity ( Year (Eg)	Generation per	59.9	GWh	F
2	Goals and e	xpected effects of	Water resources	utilization and in	crease in hydrop	ower production	1
3	o	bject construction	capacity, increas	e in stability of electri	city supply in the r	region.	
			Total Investmen	t Costs (million of €	E)	22.2	
	Estimated cost	s and structure of	Civil Works			13.6	1
4		investment	Equipment			7.1	1
			Other costs			1.5	1
		Obtaining					1
		approvals from					
	Current status	authorities					
5	of preparatory	Preparing of					
	activities	investment- technical documentation	Study of hydropo	tential of Vrbas river	finished.		
	Planned invest	ments throughout	2012.	2013.	2014.	2015.	1
6	years (million of €)		6.7	4.4	4.4	6.7	1
7	Sta	art of construction	2011/2012				
De	esign solutions for H	IPP Vinac and HPP	Babino Selo are un	ified.			

20



WF Podveležje Mali Grad 1.

**Object Name** 

**Basic Parameters** 

Location

Installed Power (Pi)

Total Electricity Generation per

Type

2. WF Podveležje Sveta Gora

### Windfarm 1

1

2

3

4

5

6 7



WF Mali Grad

PERIOD OF PROJECT IMPLEMENTATION: 4 years

activities	technical	Engineers &Aud	itors GmbH, March 2			
status of preparatory	Preparing of investment-	Feasibility study	completed – KWI Ma	Total		
Current	Obtaining approvals from authorities	Request for cond	cession submitted to t	he authorities.		New jobs (operation a
		Roads     0.4       The Rest Of Investments     4.2			Total	
Estimated Cos	investment	Equipment 47.6			Direct	
Estimated cos	te and structure of	Civil Works	•		1.9	Indirect
		Total Investmer	nt Costs (million of €	E)	54.1	Stall nired during co
Goals and o	expected effects of object construction	Using of wind-po Increasing of ele taking part in gei	ectric power generation neral emission reduct	of wind-energy ca on from the renew ion of CO <sub>2</sub> , No <sub>x</sub> ,	apacities in B&H. vable sources and	Otoff, bins d duning a s
		Total Electricity Year (Eg)	Generation per	92.5	3 GWh	PERIOD OF PROJECT IN

WF 1 Podveležje / Mostar

Mali Grad & Sveta Gora

windfarm

2× 2 MW + 14× 3 MW = 46 MW

nstruction:

Indirect	.250
Direct	.150
Total	400

and maintance):

.....15

- 1. WF Podveležje Merdžan Glava
- 2. WF Podveležje Poljice

### Windfarm 2



1		Object Name		WF 2 Podve	ežje / Mosta	r		Podveleț je
			Location		Merd	an Glava & P	oljice	· ·
			Туре			windfarm		
2		<b>Basic Parameters</b>	Installed Power	(P <sub>i</sub> )		12× 2 = 24 MW	/	
			Total Electricity	Generation per		48 G\//h		
			Year (E <sub>g</sub> )			10 0111		PERIOD OF PROJECT IMPLEMENTATION: 4 years
	Goals and	expected effects of	Using of wind-p	otentials and buildir	ig of wind-en	ergy capacities	s in BiH.	
3	C	bject construction	Increasing of el	ectric power genera	ation from the	renewable so	urces	Stoff hired during construction.
		·	and taking part	in general emission	f reduction of	$CO_2$ , $NO_x,$	25.7	Stall filled during construction.
			Total Investme	ni cosis (million d	(1€)		35.7	Indirect200
	Estimated cos	ts and structure of	CIVII WORKS				1.4	Direct100
4	investment		Equipment				0.2	Total 300
			The Post Of Inv	ootmonto			0.3	
		Obtaining	The Rest Of Inv	estiments			2.0	
		approvals from	Request for con	cession submitted t	o the authori	ties		New jobs (operation and maintance):
	Current	authorities	r toqueot for oon					Total10
5	preparatory	Preparing of	Feasibility study	completed – KWI	Janagement	Consultants &		
	activities	technical	Engineers & Aug	Engineers & Auditors GmbH March 2006				
		documentation						
6	Planned inves	tments throughout	2010.	2011.	2012.	20	)13.	
Ľ	ye	ears (million of €)	9.0	9.0	9.0	8	3.7	
7	St	art of construction	2010					

#### **Confluence of Neretvica river**

### PHASE I



#### Neretvica river

No.	Name of sHPP (Confluence of Neretvica river)	Installed power P <sub>in</sub> (kW)	Total electricity generation per year E <sub>g</sub> (MWh)
1	sHPP Crna Rijeka	2,455.00	9,104.00
2	sHPP Srijanski Most	3,528.00	14,516.00
3	sHPPGorovnik ušće	3,929.00	16,366.00
4	sHPPGorovnik	1,240.00	3,498.00
	Total Phase I	11,152.00	43,484.00
Goal	s and expected efects of object construction	Water resources utilization and capacity in BiH, increasing in region. Increasing in percentage of parti renewable energy resources, con CO <sub>2</sub> , NO <sub>x</sub> emissions	increase in hydropower production stability of electricity supply in the cipation electricity production from ntribution to the total decreasing in

#### **Confluence of Neretvica river**



#### sHPP Donji Obalj

No.	Name of sHPP (Confluence of Neretvica river)	Installed power P <sub>in</sub> (kW)	Total electricity generation per year E <sub>g</sub> (MWh)	
1	sHPP Podhum 1	2,046.00	7,966.00	
2	sHPP Podhum 2	2,482.00	10,269.00	
3	sHPP Donji Obalj	1,865.00	8,245.00	
4	sHP Poželavka	367.00	1,207.00	
5	sHPP Mala Neretvica - ušće	1,106.00	4,851.00	
	Total Phase II	7,866.00	32,538.00	
Go	oals and expected efects of object construction	Water resources utilization and increase in hydropower production capacity in BiH, increasing in stability of electricity supply in the region. Increasing in percentage of participation electricity production from renewable energy resources, contribution to the total decreasing in CO <sub>2</sub> , NO <sub>x</sub> emissions		

### PHASE II

#### **Confluence of Neretvica river**





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~ _	כונו	1.11	21/1	171
50			111	171
				_

No.	Name of sHPP (Confluence of Neretvica river)	Installed power P <sub>in</sub> (kW)	Total electricity generation per year E <sub>g</sub> (MWh)
1	sHPP Obašćica	1,586.00	5,858.00
2	sHPP Duboki Potok 2	3,776.00	14,084.00
3	sHPP Ruste	374.00	1,118.00
4	sHPP Plavuzi	395.00	1,233.00
5	sHPPProlaz	349.00	1,123.00
6	sHPP Duboki Potok 1	725.00	2,706.00
	Total Phase III	7,205.00	26,122.00
G	oals and expected efects of object construction	Water resources utilization a production capacity in BiH, inc supply in the region. Increasing in percentage of par from renewable energy resource decreasing in CO <sub>2</sub> , NO <sub>x</sub> emissi	nd increase in hydropower reasing in stability of electricity ticipation electricity production ces, contribution to the total ons

# SUMMARY

NAME	INSTALLED POWER	PRODUCTION	PERIOD OF PROJECT IMPLEMENTA TION	YEAR OF COMMISIONING	INVESTMENT COSTS	STAFF HIRED DURING CONSTRUCTI ON	NEW JOBS
	MW	GWh	year	year	Mil. €	man/year	
THERMAL POWER PLANTS	1,150.00	6,666.00	-		2,206.60	20,500	3,241
TPP TUZLA-UNIȚ 7	450.00	2,756.00	6	2017	841.60	6,500	1,165
TPP KAKANJ-UNIT 8	300.00	1,755.00	5	2018	681.00	4,000	988
TPP KAKANJ-COMBINED CYCLE	100.00	400.00	4	2020	100.00	2,000	100
M&TPP BUGOJNO-UNIT 1	300.00	1,755.00	6	2022	584.00	8,000	988
HYDROPOWER PLANTS	283.04	976.00			495.50	5,900	220
HPP USTIKOLINA	63.60	255.00	5	2015	92.20	1,000	40
HPP VRANDUK	19.56	96.38	5	2014	47.60	800	20
HPP UNAC	73.60	259.00	5	not defined	87.00	800	35
HPP KRUŠEVO & HPP ZELENI VIR	11.88	30.12	4	2014/2015	46.60	600	20
HPP VRHPOLJE	79.40	157.50	5	2016	151.80	1500	60
HPP ĈAPLJE	12.00	56.80	4	2016	23.00	400	15
HPP VINAC	11.50	61.30	4	2015/2016	25.10	400	15
HPP BABINO SELO	11.50	59.90	4	2015/2016	22.20	400	15
WINDFARMS	70.00	140.53			89.80	700	25
WF 1 – PODVELEŢJE	46.00	92.53	4	2013/2014	54.10	400	15
WF 2 - PODVELEŢJE	24.00	48.00	4	2013/2014	35.70	300	10
TOTAL	1,503.04	7,782.53			2,791.90	27,100	3,486

**\* TABLE DOES NOT CONTAIN SMALL HYDROPOWER PLANTS** 



# CONSTRUCTION PRIORITIES OF POWER PLANTS

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# COMPANY PROFILE

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- Elektroprivreda Hrvatske zajednice Herceg Bosne, d.d. Mostar (EPHZHB) is a public company for power generation, distribution and supply.
- EP HZHB was founded on August 26, 1992 and since April 28, 2004 it operates as a joint stock company.
- Due to restructuring of electric energetic sector transmission of electric power was sorted out of the company on March, 2006.
- The stock capital of the company consists of 90% of state capital and 10% of private share capital.
- EP HZHB operates with six hydropower plants with the total capacity of 792 MW (HPP Jajce I, HPP Jajce II, HPP Rama, HPP Mostar, PSPP Ĉapljina, HPP Peć Mlini).
- Total power generation in 2009 was 1,939.82 GWh and consumption on distributive level was 1,349.97 GWH while big consumers portion was 754.17 GWh, e.i. total consumption was 2,104.39 GWh.
- The Company supplies energy for 182,776 customers, and it employs 1,615 employees of good qualification structure.
- Untill year 2009 the Company imported about 2/3 of neccessary energy from international electric energetic market to fullfil the requirements of big consumers.
- The Company is focused on development of new energetic facilities according to the highest technological and ecological standards.

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			Fotal Electricity Generation per Year $(E_q)$	3,00	00.00 GWh	
			Efficiency in condensing mode	4	40,25 %	A
			Emission Limit values	NO <sub>x</sub>	<200 mg/Nm <sup>3</sup>	- C
				SO <sub>2</sub>	<200 mg/Nm <sup>3</sup>	SHOET IN
		· · · · ·		Dust	<30 mg/Nm <sup>3</sup>	Free of a strength a l
3	Goals and expected effects of object construction         -         Securing continuity of production of electrical and heat energy           -         Reduction of emission and fulfilling obligations concerning the establishment of the power market of South-East Europe           -         Increasing energy efficiency.           -         Positive effects on economy (ivestments, increasing employment, infrastructure, cogeneration)				(100,000,000,000,000,000,000,000,000,000	
4	Current status of	Obtaining approvals from authorities	Location approval for research ac dated December, 4, 2006, Tomisl Approval for research works No. ( Ministry of economy, Herzeg Bos Resolution on recogniton of coil re 05-18-6/07 dated Januar 5, 2010, county	tivities execution avgrad municipalit 05-05-186/07 date nian county eserve on Kongora Ministry of econo	No. 07-23-3-1733/06 y, d March, 14, 2007, i lignite deposit No. 05- my, Herzeg Bosnian	PERIC Sta
	activities	Preparing of investment- technical documentation	Prefeasibility Study: "Coal mine a und Wasser GmbH, Koln, German Elaborate on the classification, ca reserve on Kongora deposit near finished research works, RGGF T	nd TPP Kongora", ny, 1998. tegorization and c Tomislavgrad with uzla, EP HZ HB, 2	Rheinbraun Enginering alculation of lignite associated Reports on 009.	Nev
5		Estimated costs	Total investment cost (million of (which relate to coal mine and the plant)	of €) - aprox. ermal power	1,100.00	

According to long term energy supply plan till 2030. of JP EP B&H, it is



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M&TPP Kongora

IBVATUR.

#### PERIOD OF PROJECT IMPLEMENTATION: 5 years

Staff hired during construction:

Indirect	4000
Direct	2000
Total	6000
New jobs (operation and maintance	e):
Mine	.586
Thermal power plant	.204
Total	790

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#### **RIVER BASIN UPPER CETINA**

### **PSPP** Vrilo

1		Object Name	•	PSPP Vrilo / Tomislavgrad					
			·Location			R.Šuica.	Duvanjsko fie	ld / Buško field	
			Туре				Pumped sto	rage	
2		Basic Parameters	Installed Powe	r (P <sub>i</sub> )			2x26 =52 M	ЛW	
			Total Electricit (E <sub>g</sub> )	y Generation pe	r Year		95.42 GW	/h	
3	Goals and e of	xpected effects of oject construction	Water resource increase in sta of participation contribution to	es utilization and bility of electricit of electricity p the total decreas	d increase by supply i production sing in CO	e in hydr in the reg from re 2, NO <sub>x</sub> ei	opower produ gion. Increase enewable ene missions,	etion capacity, in percentage rgy resources,	
			Total Investme	ent Costs (milli	on of €)			60.76	
4	Estimated co	osts and structure	Civil Works				32.81		
		of investment	Equipment 21.2				21.27		
			Other costs 6.68						
	Current	Obtaining approvals from authorities	Strategic environmental assessment ot Trebiț at and Cetina River Basins, SNC Lavalin, 2008.						
5	preparatory activities	Preparing of investment- technical	Feasibility Study, Elektroprojekt d.d.Zagreb, Croatia, 20082010. Investigation Works, LOT 1-5, 2009.						
	Dia	documentation	0010	0011	00.10		0040	0011	
	Pla	nned investments	2010.	2011.	2012	2.	2013.	2014.	
0		(million of €)		18.23	18.2	3	24.30		
7	Sta	rt of construction	2011.						



#### **PSPP** Vrilo

#### **PERIOD OF PROJECT IMPLEMENTATION: 3 years**

Staff hired during construction:

Indirect	250
Direct	150
Total	400

New jobs (operation and maintance):

### **RIVER BASIN UPPER CETINA**

### PSPP Kablić

1		Object Name		P	SPP Kabli	ć / Livno	)	•
			Location			Glar	noĉko and liva	anjsko field
1			Туре				Pumped sto	orage .
2		Basic Parameters	Installed Powe	r (P <sub>i</sub> )			2x26 = 52	MW
			Total Electricit (E <sub>g</sub> )	Total Electricity Generation per Year				 Vh
3	Goals and e ol	xpected effects of bject construction	Water resources utilization and increase in hydropower production capacity, increase in stability of electricity supply in the region. Increase in percentage of participation of electricity production from renewable energy resources, contribution to the total decreasing in CO <sub>2</sub> , NO <sub>x</sub> emissions,					
			Total Investment Costs (million of €)				58.42	
4	Estimated co	osts and structure	Civil Works				30.00	
Ξ.	of investmen <u>t</u>		Equipment				24.44	
			Other costs 3.9					3.98
	Current	Obtaining approvals from authorities						
5	preparatory activities	Preparing of investment- technical documentation	Prefeasibility S Department, til	Study (in progres I the end of 201	s) JP EP H 0.	IZHB d.c	l.Mostar, Dev	elopement
	Planned investments		2014.	2015.	2016	δ.	2017.	2018.
6		throughout years (million of €)		14.60	26.3	0	17.52	
7	Sta	rt of construction	2015.					



#### PSPP Kablić

PERIOD OF PROJECT IMPLEMENTATION: 3 years

Staff hired during construction:

Indirect	250
Direct	150
Total	400
Total	

New jobs (operation and maintance):

#### **RIVER BASIN VRBAS**

### HPP Han Skela

		•					•
1		Object Name		HP	P Han Skela / Jajo	ce	
			Location			River Vrbas /	/ Jajce
						Run – of –	river · ·
2		Basic Parameters	Installed Powe	Installed Power (Pi)			/W
			Total Electricit (E <sub>g</sub> )	y Generation pe	er Year	52 GWI	h
3	Goals and e of	xpected effects of oject construction	Water resourc increase in sta of participation contribution to	es utilization an bility of electrici of electricity the total decrea	d increase in hyd ty supply in the re production from r sing in CO <sub>2</sub> , NO <sub>x</sub> e	ropower produ gion. Increase enewable ene missions,	uction capacity, e in percentage ergy resources,
			Total Investment Costs (million of €) 2				29.50
	Estimated co	osts and structure	Civil Works 1;				
4	of investment		Equipment		10.09		
			Other costs 2.0				
	Current	Obtaining approvals from authorities					
5	preparatory activities	Preparing of investment- technical documentation	Prefeasibility S	tudy, Elektropro	ijekt d.d.Zagreb, C	roatia, 2007.	
	Pla	nned investments	2010.	2011.	2012.	2013.	2014.
6		throughout years (million of €)				11.8	17.8
7	Sta	rt of construction	2013.				



#### HPP Han Skela

#### PERIOD OF PROJECT IMPLEMENTATION: 2 years

Staff hired during construction:

Indirect	200
Direct	100
Total	

New jobs (operation and maintance):

#### RIVER BASIN VRBAS – PROJECTS PLANNED ON ENTITY BORDER RIVER

### HPP Ugar Ušće

1		Object Name		HP	P Ugar Ušće / V	/rbas		
			Location		Ŭ	River Vrbas /	Jajce	
			Туре			. Run – of - r	iver	
2		Basic Parameters	Installed Powe	r (P <sub>i</sub> )		2x5,8 = 11,6	MW	
			Total Electricit (E <sub>g</sub> )	ty Generation po	er Year	33.188 G\	Wh	
3 Goals and expected effects of object construction of participation of electricity production from contribution to the total decreasing in CO <sub>2</sub> , NO <sub>x</sub>					ydropower produ region. Increase renewable ene x emissions,	iction capacity, in percentage rgy resources,		
			Total Investment Costs (million of €) 12					
	Estimated co	Estimated costs and structure		Civil Works				
4		of investment	Equipment					
			Other costs 1					
	Current	Obtaining approvals from authorities						
5	preparatory activities	Preparing of investment- technical documentation	Prefeasibility S	Study, Elektropro	ojekt d.d.Zagreb	, Croatia, 2007.		
	Pla	nned investments	2013.	2014.	2015.	2016.	2017.	
6		throughout years (million of €)		5.15	7.72			
7	Sta	art of construction	2014.					



#### HPP Ugar Ušće

#### PERIOD OF PROJECT IMPLEMENTATION: 2 years

Staff hired during construction:

Indirect	200
Direct	150
Total	

New jobs (operation and maintance): Total.....7

#### RIVER BASIN VRBAS – PROJECTS PLANNED ON ENTITY BORDER RIVER

### HPP Vrletna kosa

1		Object Name		HPP	Vrletna k	kosa / r. l	Jgar	٠	100
			Location				River Ugar / J	lajce	-1-
			Туре				Run – of - ri	ver	1.00
2		Basic Parameters	Installed Powe	r (P <sub>i</sub> )		•	2x5,6 = 11,2	MW .	and and
			Total Electricit (E <sub>a</sub> )	ty Generation pe	er Year		22.538 GW	/h · ·	
3	Goals and expected effects of object construction         Water resources utilization and increase in hydropower production capacity, increase in stability of electricity supply in the region. Increase in percentage of participation of electricity production from renewable energy resources, contribution to the total decreasing in CO <sub>2</sub> , NO <sub>x</sub> emissions,					Contraction of the			
Т			Total Investment Costs (million of €)				6.93		
	Estimated co	Estimated costs and structure		Civil Works				3.68	
4		of investment	Equipment				2.18		
		•	Other costs					1	
	Current	Obtaining approvals from authorities							
5	preparatory activities	Preparing of investment- technical documentation	Prefeasibility S	Study, Elektropro	ijekt d.d.ž	Zagreb, C	roatia, 2007.		SI
	Pla	nned investments	2014.	2015.	201	16.	2017.	2018.	
6		throughout years (million of €)			2.7	77	4.16		
7	Sta	rt of construction	2016.				•		٦



#### HPP Vrletna kosa

PERIOD OF PROJECT IMPLEMENTATION: 2 years

Staff hired during construction:

Indirect	200
Direct	100
Total	

New jobs (operation and maintance):

#### RIVER BASIN VRBAS – PROJECTS PLANNED ON ENTITY BORDER RIVER

### HPP lvik

<u> </u>								
1		Object Name		HPP Vrletna kosa / r. Ugar				
			Location			River Ugar / Ja	ajce	
			Туре		·	Run – of - riv	'er	
2		Basic Parameters	Installed Power	<sup>-</sup> (P <sub>i</sub> )		2x5,6 = 11,2 M	۸W	
			Total Electricit (E <sub>g</sub> )	y Generation pe	r Year	21,883 GW	h "	
3	Goals and e of	xpected effects of bject construction	Water resource increase in sta of participation contribution to	es utilization an bility of electrici of electricity p the total decreas	d increase in hyd ty supply in the re production from r sing in CO <sub>2</sub> , NO <sub>x</sub> e	ropower produc gion. Increase i enewable energ missions,	tion capacity, n percentage gy resources,	
			Total Investment Costs (million of €)			6.93		
	Estimated costs and structure of investment		Civil Works			3.68		
4			Equipment			2.18		
1			Other costs			1.07		
	Current	Obtaining approvals from authorities						
5	preparatory activities	Preparing of investment- technical documentation	Prefeasibility S	tudy, Elektropro	jekt d.d.Zagreb, C	roatia, 2007.		
	Pla	nned investments	2013.	2014.	2015.	2016.	2017.	
6		throughout years (million of €)			2.772	4.158		
7	Sta	rt of construction	2015.					



HPP Ivik

**PERIOD OF PROJECT IMPLEMENTATION: 2 years** 

Staff hired during construction:

Indirect	200
Direct	100
Total	300

New jobs (operation and maintance):

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#### Measuring station Borova glava

### WF Borova glava

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1		Object Name		WF Borova	glava/ Livno	•			
			Object Location		Borova g	lava/Livno.			
2	Main C	biast Information	Object Type		Wind	dfarm			
4	Main Object Information		Installed Power (Pi	)	26× 2 MW	/ = 52 MW			
			Full Year Production	on(E <sub>g</sub> )	· 149.6	2 GWh			
	Expected e	fect and points of	Using of wind-pote	ntials and building of	wind-energy BIH ca	apacities. "			
3	building /	reconstruction of	Increasing of elect	Increasing of electric power production from the regenerable sources and					
		object	taking part in gene	ral lowering of CO2,	Nox,				
			Full Investment C	osts (million of €)		78.0			
	Conto	coloulations with	Civil Works			2.2			
4	structure of investment		Equipment			68.			
			Roads			2.			
			The Rest Of Invest	4.9					
	permission of competent								
5	Actual condition of basic activities	Planning of investment- technical documentation	Project: Analysis for Bosnia and Herzeg Review of the Proje 2008. Anemos-Jacob Gm Final design for 11 Velika Vlajna, Ener Geotechnical Study Environmental and Inc, Athens, Greec Waste managemen Feasibility Study, E	or the Use of Wind P jovina, "NIP, SA", Ma ect was conducted b hbH , Germany 2008 0kV Substation for w gocontrol d.d. Zagre y, Geo-Marić Mostar Social Impact Asse e, Hydrotechnic Insti nt plan, EP HZ HB 2009.	ower for Electricity G adrid, 20042006. y "GARRAD HASSA ind farms Tomislavg b,20082009. 2008. ssment for Wind Par tute Sarajevo, , B&H 009.	Generation in N" Zaragoza, grad, Livno and k Project, Exergia I,20082009.			
$\neg$	Dynamic plan	of realisation with	2010.	2011.	2012.	2013.			
	plan of investment by the years (million of €)								



**PERIOD OF PROJECT IMPLEMENTATION: 2 years** 

Staff hired during construction:

Indirect	250
Direct	100
Total	.350

New jobs (operation and maintance): Total.....16

Measuring station Mesihovina

### WF Mesihovina

1		Object Name	WF Mesihovina/ Tomislavgrad			
			Object Location		Mesih	ovina/Tomislavgrad
_	Main C		Object Type Windfarm		Windfarm	
2	Main C	bject information	Installed Power (Pi	Installed Power (P <sub>i</sub> ) 22× 2 MW = 44 MW		< 2 MW = 44 MW .
			Full Year Production	on(E <sub>g</sub> )		128.53 GWh
	Expected e	fect and points of	Using of wind-pote	ntials and building of	wind-energy BIH ca	pacities. Increasing of electric • •
3	building /	reconstruction of	power production f	rom the regenerable	sources and taking	part in general lowering of CO2.
		object	Nox,			
			Full Investment C	osts (million of €)		66.67
	Costs	calculations with	Civil Works			1.95
4	struct	ure of investment	Equipment			58.59
			Roads			1.93
			The Rest Of Invest	ments		4.2
		Getting permission of competent organs	december 2007. Hercegbosnian canton Local Municipality Tomislavgrad. Concession contract, no. I-7025/09, between EP HZ HB and Ministry of economy, Herceg- bosnian canton. Cooperation Contract, no. I-7270/09 between EP HZ HB and Local municipality Tomislavgrad			
5	Actual condition of basic activities	Planning of investment- technical documentation	Project: Analysis for the Use of Wind Power for Electricity Generation in Bosnia and Herzegovina, "NIP, SA", Madrid, 20042006. Review of the Project was conducted by "GARRAD HASSAN" Zaragoza, 2008. Anemos-Jacob GmbH , Germany 2008. Final design for 110kV Substation for wind farms Tomislavgrad, Livno and Velika Vlajna, Energocontrol d.d. Zagreb, 20082009. Geotechnical Study, Geo-Marić Mostar 2008. Environmental and Social Impact Assessment for Wind Park Project, Exergia Inc, Athens, Greece, Hydrotechnic Institute Sarajevo, , B&H,20082009. Waste management plan, EP HZ HB 2009.			
	Dynamic plan	of realisation with	2010.	2011.	2012.	2013.
6	plan of invest	ment by the years (million of €)		26.67	40.00	



#### PERIOD OF PROJECT IMPLEMENTATION: 2 years

Staff hired during construction:

Indirect	200
Direct	100
Total	300

New jobs (operation and maintance): Total.....14

#### Measuring station Velika Vlajna

### WF Velika Vlajna

							•
	1		Object Name		WF Velika V	lajna/Mostar	
Internition						Velika vlaj	na/Mostar
Ivannea	2	Main C	biect Information	Object Type		Wind	farm
	~	indiri e	bjeet momuten	Installed Power (Pi	)	16× 2 MW	= 32 MW
				Full Year Production	on(E <sub>g</sub> )	· 89.36	GWh ·
		Expected e	fect and points of	Using of wind-pote	ntials and building of	f wind-energy BIH ca	pacities
	3	building /	reconstruction of	Increasing of elect	ric power production	from the regenerabl	e sources and
			object	taking part in gene	ral lowering of CO2,	Nox,	
				Full Investment C	osts (million of €)		52.72
		Costs	calculations with	Civil Works			1.42
	4 costs calculations with		Equipment			44.80	
		Structure of investment		Roads			2.00
				The Rest Of Investments			4.5
		permission of competent organs					
novina	5	Actual condition of basic activities	Planning of investment- technical documentation	Project: Analysis for the Use of Wind Power for Electricity Generation in Bosnia and Herzegovina, "NIP, SA", Madrid,20042006. Review of the Project was conducted by "GARRAD HASSAN" Zaragoza, 2008. Anemos-Jacob GmbH , Germany 2008. Final design for 110kV Substation for wind farms Tomislavgrad, Livno and Velika Vlajna, Energocontrol d.d. Zagreb,20082009. Geotechnical Study, Geo-Marić Mostar 2008. Environmental and Social Impact Assessment for Wind Park Project, Exergia Inc, Athens, Greece, Hydrotechnic Institute Sarajevo, , B&H,20082009. Waste management plan, EP HZ HB 2009. Feasibility Study, EP HZ HB 2009.			
		Dynamic plan	of realisation with	2010.	2011.	2012.	2013.
	6	plan of invest	ment by the years (million of €)			21.08	31.64



#### PERIOD OF PROJECT IMPLEMENTATION: 2 years

Staff hired during construction:

Indirect1	50
Direct	<u>70</u>
Total2	20

New jobs (operation and maintance):

#### Measuring station Pokleĉani



### WF Pokleĉani

1		Object Name		WF Pokleĉa	ani/ Posušje	•	
			Object Location	ocation		Posušje	
2	Main (	Main Object Information			Wi	ndfarm	
2	Main C		Installed Power (Pi	)	36× 2 M	N = 72 MW	
			Full Year Production	on(E <sub>g</sub> )	. 258,5	i95 GWh	
	Expected e	fect and points of	Using of wind-pote	ntials and building of	f wind-energy BIH	capacities.	
3	building /	reconstruction of	Increasing of elect	ric power production	from the regeneral	ole sources and	
	object		taking part in gene	ral lowering of CO2,	Nox,		
			Full Investment C	osts (million of €)		108.00	
	Costs	Costs calculations with		Civil Works			
4	structure of investment		Equipment			94.93	
			Roads			3.11	
			The Rest Of Investments			7.05	
		Getting					
		permission of					
	Actual	competent					
5	condition of	organs					
	Dasic	Planning of		and the line of the second second	unated exclusion finit	le e el ferre sue ene	
	activities	Investment-	Site prospection, in	aps, preliminary fina	ancial analysis, finis	sned two years	
		documentation	measuring cycle of	measuring cycle on 10 m pole.			
	Dynamic plan	of realisation with	2012	2013	2014	2015	
6	plan of invest	ment by the years	2012.	2013.	2014.	2013.	
ľ	plan of invest	(million of €)		43.2	64.8		



PERIOD OF PROJECT IMPLEMENTATION: 2 years

Staff hired during construction:

Indirect	300
Direct	10
Total	400

New jobs (operation and maintance): Total.....22

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Šuica River



### **RIVER BASIN UPPER CETINA**

			Basic Parameters					
No.	Object Name	Pivor			Installed power	Total Electricity Generation per Year		
			Object Location	Object Type	(P <sub>i</sub> )	(E <sub>g</sub> )		
					MW	GWh		
1.	SHPP Mokronoge	Cetina	Tomislavgrad	Run of river	3.791	7.668		
2.	SHPP Stržanj	Cetina	Kupres / Tomislavgrad	Derivation	7.38	20.80		
3.	SHPP Šuica	Cetina	Tomislavgrad	Run of river	1.90	4.21		
	Total basin Cetina: 13.071 32.678							
Goal	s and expected efects o	f object construction	Water resources utilization and increase in hydropower production capacity in B&H and Croatia, increasing in stability of electricity supply in the region. Increasing in percentage of participation electricity production from renewable energy resources, contribution to the total decreasing in CO <sub>2</sub> , NO <sub>x</sub> emissions					



**SHPP Klokun- Mlade** 



### **RIVER BASIN T - M - T**







			Basic Parameters					
No.	Object Name	River			Installed power	Total Electricity Generation per Year		
			Object Location	Object Type	(P <sub>i</sub> )	(E <sub>g</sub> )		
	•				MW	GWh		
1.	SHPP Modro oko	Tihaljina	Grude	Run of river	3.74	12.22		
2.	SHPP Klokun	Mlade	Ljubuški	Derivation-Run of river	3.256	12.00		
3.	SHPP Koćuša	Mlade	Ljubuški	Derivation-Run of river	4.85	18.40		
4.	SHPP Kravica	Trebižat	Ljubuški	Derivation-Run of river	4.996	21.81		
5.	SHPP Stubica	Trebižat	Ljubuški/Grude	Derivation-Run of river	2.946	12.75		
	Total basin T – M - T: 19.788 77.18							
Goals and expected efects of object construction			Water resources utilization and increase in hydropower production capacity in B&H and Croatia, increasing in stability of electricity supply in the region. Increasing in percentage of participation electricity production from renewable energy resources, contribution to the total decreasing in CO <sub>2</sub> , NO <sub>x</sub> emissions					

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Located Dubrave

SHPP Dubrava -Lištica

### RIVER BASIN LIŠTICA





NAME	INSTALLED POWER	PRODUCTION	PERIOD OF PROJECT IMPLEMENTATION	YEAR OF COMMISIONING	INVESTMENT COSTS	STAFF HIRED DURING CONSTRUCTION	NEW JOBS
No. 1	MW	GWh	Year	Year	∷ Mil.€	Man/Year	
THERMAL POWER PLANTS	550.00	3,000.00			1,100.000	6,000	790
M&TPP KONGORA	550.00	3,000.00	5	2017	1,100.000	6,000	790
HYDROPOWER PLANTS	150.60	298.16			175.41	2,050	81
PSPP VRILO	52.00	95.42	3	2013	60.76	400	25
PSPP KABLIĆ	52.00	73.13	3	2017	58.42	400	25
HPP HAN SKELA	12.00	52.00	2	2014	29.50	300	10
HPP UGAR UŠĆE	11.60	33.19	2	2015	12.87	350	7
HPP VRLETNA KOSA	11.80	22.54	2	2017	6.93	300	7
HPP IVIK	11.20	21.88	2	2016	6.93	300	7
WINDFARMS	200.00	626.11			305.39	1,270	62
WF BOROVA GLAVA	52.00	149.62	2	2014	78.00	350	16
WF MESIHOVINA	44.00	128.53	2	2012	66.67	300	14
WF VELIKA VLAJNA	32.00	89.36	2	2013	52,72	220	10
WF POKLEĈANI	72.00	258.60	2	2014	108.00	400	22
TOTAL	900.60	3,924.27			1,580.80	9,320	933

\* TABLE DOES NOT CONTAIN SMALL HYDROPOWER PLANTS

### RUDNICI MRKOG UGLJA "BANOVIĆI" d.d. Banovići

### **M&TPP Banovići**

# PRIORITIES ELECTRIC POWER PLANTS CONSTRUCTION IN THE FEDERATION OF B&H

banovići

# COAL MINE & POWER STATION "BANOVICI"

### A. COAL MINE (RMU)

RMU Banovici is located in the north - east part of Bosnia and Herzegovina. RMU Banovici occupies an area of about 27km2.

### RMU Banovici was launched in 1946.

Today the coal mine Banovici has about 2690 employees, produces more than 1.500.000 tons of brown coal and mainly delivers to the Power station Tuzla, industry and other consumers. RMU "Banovici" is a company with the following shareholders:

1. State 69,30123 %

2. Private

RMU Banovici produces high quality brown coal with an average caloric value above 15 000 kJ/kg with average layer thickness of about 17 m.

30,69877 %

### Structure of the Coal mine Banovici:

- 1. Underground coal mine,
- 2. Open-pit coal mines,
- 3. Separation,
- 4. Rail transport,
- 5. Standard and services,
- 6. Directorate.

54 Banovici is the member of European association "EURACOAL" since 2005.

### Characteristics of coal from Banovici Coal mine

5		2-2857 	S.M. Turija kJ/kg	S.M. Grivice kJ/kg	U.M. Omazići kJ/kg	Mixture 40:40:20 (%) kJ/kg
Minim	um inferior caloric value	kJ/kg	13248	13674	16420	14053
	Combustible matter	%	52,98	55,60	60,21	55,47
1	Total sulphur Su	%	1,42	1,52	1,83	1,54
2	Inherent sulphur Sv	%	0,74	0,71	0,87	0,75
3	Combustible sulphur Sg	%	0,68	0,81	0,96	0,79
4	Ash	%	24,96	27,38	24,82	26,9
55	Total humidity	%	22,06	17,02	14,97	19,96

#### **GEOLOGIC RESERVES OF COAL**

#### **Current coal reserves identified by research:**

- a. Balance.....196 804 843 t
- b. Off-Balance.....12 784 234 t

#### Total exploitable coal reserves :146 470 000 t.



#### Graf: Coal reserves in the Coal Mine Banovici

RMU BANOVICI CURRENTLY HAS 3 ACTIVE OPEN-PIT MINES: SM CUBRIC, AND SM TURIJA MINED WITH DISCONTINUITY EXCAVATION SM GRIVICE TECHNIQUE WITH AVERAGE UNCOVERING CEOFFICIENT OF 8 M3 S.M./T.S.C. PK\*SECAR 44.6. Vanjsko odlagalište za PK "GRIVICE" PK TERONYC Terfectica Discia Vanjsko odlagalište PK "GRIVICE" PK "TURUA" za PK "TURUA" James Per Jol 14 MAA TOMATICA PS Banovici a bakar Q.C. . ... lanovici Selda

> LOCATION OF OPEN-PIT MINES AND UNDERGROUND MINE

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PK\*CUBRC

The necessary production investments with the goal of securing supplies for PS Banovici until 2018.

Investment of 44 milions € is needed until 2018, to renew all equipment from the mines resources, after which we have an amortization period.

Humanization of work by investments

#### THE HIDROLOGY OF THE AREA:

Coal mine Banovici is, in a hydrographic sence, located between Spreca river in the north and Krivaja river in the south, thus all minor surface flows belong to the confluences of this two rivers. The main recepient in the observed area is the Turija river with an average water flow of 8 m3/min.

As per the yearly precipitation data Banovici basin belongs to the zone where the average precipitation quantity falls between 1000 to 1200 mm.

The real unprocessed water sources for the PS Banovici are S.M. Turija, Luke, Besin and Ramici water accumalations, which have been made with drainage from open-pit mines (Picture 1).Total available water quantity from these accumulations are about 5,5 millions m3/year. This means that we can secure enough water for the needs of PS Banovici.



### **B. POWER STATION BANOVICI 300 MW**

CHARACTERISTICS OF PS BANOVICI

CONSTRUCTION OF PS BANOVICI WAS PLANNED IN THE CENTRAL PART OF THE COAL BASIN WHICH SOLVES PROPERTY RIGHTS CONCERNS.

THE PLANNED TOTAL POWER OF POWER STATION BANOVICI IS 300 MW/ 350 MVA, WITH TOTAL YEARLY PRODUCTION OF 1706,25 GWH PER YEAR.

PROJECT CALLS FOR CONSTRUCTION OF A SINGLE STEAM BOILER, CONDENSATION TURBINE WITH A GENERATOR AND BACKUP SYSTEMS AND ENERGY PRODUCTION INFRASTRUCTURE FOR ELECTRIC ENERGY PRODUCTION.

OF THE TOTAL POWER 7 - 8% WILL BE USED BY THE PS ITSELF.

PS BANOVICI WILL BE SUPPLIED WITH COAL FROM S.M. TURIJA, S.M. GRIVICE I U.M. OMAZICI.

PS BANOVICI WILL BE CONSTRUCTED IN THE CENTRAL PART OF COAL BASIN BANOVICI.

60 ECISELY BETWEEN TOWN TUZLA, LAKE MODRAC AND KONJUH MOUNTAIN .

1	Object Name	Unit 1,300 MW	–TPP Banovici			
2		Location At the location of Banovici near open-		Municipality pit mines		
		Type TPP - with CFB or p burning		ulverized coal		
		Fuel	Brown Coal H <sub>d</sub> = 14.	050 KJ/kg;		
	<b>Basic Parameters</b>	Installed net electric Power	300 MW <sub>e</sub> 1706 GWh			
		Efficiency	> 40 %			
		Emission Limit values	NO <sub>x</sub>	<200 mg/Nm <sup>3</sup>		
			SO <sub>2</sub>	<200 mg/Nm <sup>3</sup>		
			Dust	<30 mg/Nm <sup>3</sup>		
3	Goals and expected effects of object construction	Development of Coal Mine Banovici Insured supply of the region.				
4	Estimated costs	Total investment cost (million of €) Present estimation of investments in is about 2.300.000,00 €/MW	690,00 (miliona €)			
5	Plan of realization	Coal Mine Banovici is in charge of implementation of all activities.				
6	Influence on	Number of employees in the develo	2500			
6	employment	Number of employees in the exploit	200			

### c)400 kV DV Tuzla – Stanari –Banja Luka

BASED ON THE DISPOSITION OF THE LOCATION THE POWER STATION BANOVICI WILL BE MADE ON THE EXISTING 220 KV TRUNK LINE TS TUZLA 4 - RP KAKANJ.

)220 kV DV Tuzla – Zenica

Vulcowney

onica

5607

TE Banovići ★

a) 220 kV DV Tuzla - RP Kakanj

d)400 kV DV Tuzla – TE Kakanj

Calabeles

BANOVICI

Lokacija TE Banovići

#### AVAILABLE DOCUMENTS AND PROVIDED CONCORDS FOR CONSTRUCTION OF PS BANOVICI

- 1. Pre-feasibility study for construct "Power station Banovici"
- 2. Water balance study of untreated water for PS Banovici
- 3. Conclusion of the municipal council giving an unanimous support for RMU Banovici as a part of a future integral company, R i TE Banovici Coal mine and Power station).
- 4. Decision of the Federacije BiH Goverment about proclaimed public interes and begining of preparation and construction of priority power objects Federacije BiH nb 98/10 of 15.02.2010. (in article 1 this decision defines project construction RiTE Banovici 300 MW where RMU Banovici is carrier of all implementational activities).
- 5. PS Banovici will fulfill all EU ecological directives.

#### SCHEDULING PLAN

Scheduling plan predicts a total of 100 months from verification of pre-feasibility study, which means until the trial run in the end of 2017.

#### **STRUCTURE OF INVESTMENTS FOR – PS Banovici 300 MW**

Power Station investment costs are defined on the basis of the technical solution. Overall investment covers building costs, equipment costs, nonmaterial investments, costs of financing and working capital in total 623.716.063 € without VAT and other taxes with dynamics until the end 2017.

The way of securing fiscal structure is through application of a strategic partner (joint-venture arrangement) with respect to all legal procedures for selection.



### ECONOMIC JUSTIFICATION OF PROJECT

The economic justification of the entire project is undoubtedly proven by the pre-feasibility study in the annual income for the mine and PS in the average amount of **27,3** milliona **(** 

Economic evolution is show in the two characters:

- 1. Expansion of Coal mine capacities
- 2. Construction of Power station Banovici
- Increase in production of the coal mine has a great deal of influence on the profitability of the coal mine.
- Results of economic-fiscal analysis, showed justification of investment.
- Other factors...

#### BRIEF

Coal mine Banovici is the company which regularly takes care of all its responsibilities to the state and providers, and with continuous investment in the production not only secures tenable development but also a continuous reclamation of empoyees' standards.

Hitherto business results of Coal mine Banovici are a proof of ability for more challenges, like construction of PS Banovici, with full support of local comunity and state which is not questionable at this moment. This project is a ctive effort and it is for the better future not only of the Banovici munity but of the entire FBiH.

### **OTHER POWER PLANTS**

### HPPs Gornja Neretva

# **OTHER PROJECTS**

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### HPPs Gornja Neretva

No.	Name of HPP (Gornja Neretva)	Installed power P <sub>in</sub> (MW)	Generation per year E <sub>g</sub> (GWh)	Estimated investment (mil. €)
1	HPP Glavatiĉevo	3x9,50	108,00	
2	HPP Bjelimići	2x50,00	219,00	
3	RHPP Bjelimići	2x300,00	1029,00	
	Total	~730	~1.356,00	~ 900
	Note	For above mentioned Hyd progress. Responsible company for construction will be assign of Government of FB&H, I	dropower plants, assignment of or preparation and implementation ned after completion of concession February 15, 2010, Article IX).	concession is in activities for plants on approval process (Act

### SUMMARY

### POWER PLANTS IN FB&H – First phase

	1				
COMPANY	DATA	ТРР	HPP	WF	TOTAL
PE ELEKTROPRIVREDA BIH					
	Installed power (MW)	1150,00	283,04	70,00	1503,04
	Generation (GWh)	6666,00	976,00	140,53	7782,53
	Investment costs (mil. €)	2206,60	495,50	89,80	2791,90
	Employment (construction period and O&M- estimation)				~30590
PE ELEKTROPRIVREDA HZHB					
	Installed power (MW)	550,00	150,60	200,00	900,60
	Generation (GWh)	3000,00	298,16 ,	. 626,11	3924,27
	<ul> <li>Investment costs (mil. €)</li> </ul>	1100,00	, 175,41 · ·	· 305,39 ·	1580,80
	Employment (construction period and O&M- estimation)				~10250
RMU BANOVIĆI					
	Installed power (MW)	300,00			300,00
	Generation (GWh)	1706,00			1706,00
	Investment costs (mil. €)	690,00			690,00
	Employment (construction period and O&M- estimation)				4500
HPPs GORNJA NERETVA	Installed power (MW)		730,00		730
	Generation (GWh)		1356.00		1356.00
	Investment costs (mil. €)		900.00		900.00
	Employment (construction period and O&M- estimation)				4500
TOTAL					
	Installed power (MW)	2000,00	1163,64	270,00	3434
	Generation (GWh)	11372,00	2630,16	766,64	14769
	Investment costs (mil. €)	3996,60	1570,91	395,19	5963
	Employment (construction period and O&M- estimation)				~ 49840

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