



PROFESSIONAL
PRODUCTS



SOLUTION PARTNERS



■ SERMAN ENERGY

TURBINES: ■ Pelton ■ Francis ■ Kaplan



■ ELPROM-ZEM

HYDRO GENERATOR: ■ Async ■ Sync ■ Up to 235MW



ABOUT US



Since 1989, Dokar Ltd. has been building the energy infrastructure of Turkey, mainly by focusing on the turnkey construction of dams, irrigation facilities and installation of mechanical/electrical equipment and instrumentation under various state contracts. Through projects realized, Dokar has acquired invaluable experience and problem solving capability, not only in technical terms but also in relationship management with government & state authorities.

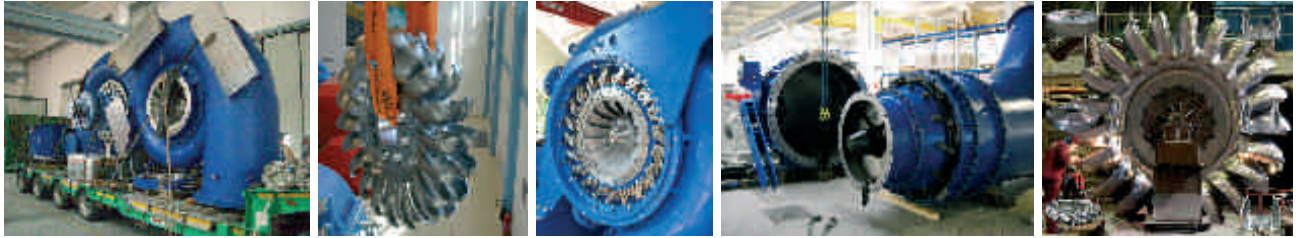
Dokar, relying on her past experience of building dams and thermal power plants, is very much involved in the renewable energy market as well. We have recently signed a strategic partnership agreement with Serman Energy Srl. an Italian hydro turbine, valve and spiral case producer and Elprom-Zem a Bulgarian hydro-generator firm manufacturing from 10kVA up to 235MVA range products. Dokar with vast experience in designing and building hydraulic structures and Serman with water turbine design and manufacture, Elprom-Zem with its hydro-generator manufacturing capability, the partnership has the unique interlocking matrix of customized components engineered into one electrifying program to offer a complete water-to-wire hydroelectric power plants HEPP not only in Turkey but also elsewhere.



ABOUT US



Founded in 1995, Serman started life as a small business on an artisan scale concerned with providing services and maintenance in the mechanical sector, focussing above all on industrial plants and the energy sector.



This small industry has its roots embedded in a region boasting an extraordinary wealth of technical expertise and tradition, which has been handed down from generation to generation.

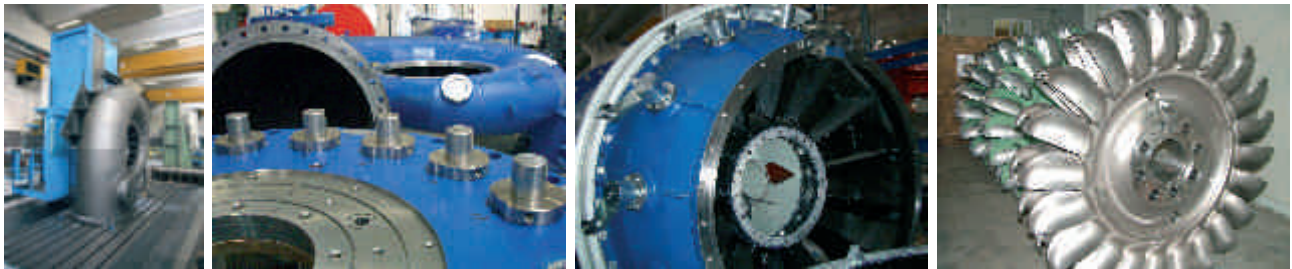
Over the years, they acquired a set of skills and references that led them to become a benchmark in the tricky management of the scheduled and non-routine maintenance of plants.



ABOUT US



In 2008, hefty investments in technology and human resources, as a result of the company changing hands, led to the birth of the Serman Energy Project. An ambitious, far-sighted project that was keenly advocated by the new company owners, who already held the reins of one of the world's major lifting system manufacturers.



The company switched from their original maintenance role to the more strategic and organic role of global player, effectively establishing themselves as an ideal partner in the consulting, design, production and maintenance of small hydroelectric power stations. Turnkey projects that begin with the economic and financial analysis of a plant's profitability.



REFERENCE LIST



<p>Client S.E.R. S.r.L. Gruppo Radici</p> <p>Property S.E.R. S.r.L.</p> <p>Place Possaccio (Verbania) - Italy</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of a new penstock DN 1200 PN 6 Length 187 meters, complete of all accessories and expansion joints.</p> <p>Execution time July 2000</p>
<p>Client VOITH RIVA HYDRO S.P.A. (MI)</p> <p>Property ALCAN ALLUMINIO S.P.A.</p> <p>Place MONTALTO DORA (TO)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Mechanical assembly and technical support to the setting at work of a Kaplan Group of 2000 kW.</p> <p>Execution Time August 2000</p>
<p>Client GESTIONI INDUSTRIALI RIVAROLO S.R.L.</p> <p>Property GESTIONI INDUSTRIALI RIVAROLO S.R.L.</p> <p>Place STROBA (TO)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Construction and Assembly of a penstock DN 1000 PN 10 complete of expansion joints, special pieces and accessories of length 190 m</p> <p>Execution Time November 2000</p>
<p>Client ENEL PRODUZIONE Area Nord Est Vittorio Veneto (TV)</p> <p>Property ENEL</p> <p>Place PERAROLO (BL)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Revision of butterfly valve of a penstock DN 2200 (Perarolo Hydroelectric Power Plant)</p> <p>Execution Time September 2001</p>
<p>Client ENEL PRODUZIONE Area Nord Est Vittorio Veneto (TV)</p> <p>Property ENEL</p> <p>Place SANTA CROCE (BL)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Revisioin of hydraulic system for movement of penstocks of Santa Croce intake construction. N. 8 penstocks for a flow of 250 mc/s.</p> <p>Execution Time September 2001</p>

REFERENCE LIST



<p>Client ENEL GREEN POWER PISA</p> <p>Property ENEL</p> <p>Place BASSO PIOVA (TO)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of control system for turbines type Francis (Basso Piova Hydroelectric Power Plant – n. 2 units)</p> <p>Execution time September 2001</p>
<p>Client ENEL GREEN POWER PISA</p> <p>Property ENEL</p> <p>Place PORTE CHISONE (TO)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of control system for a Francis turbine (Porte Chisone Hydroelectric Power Plant)</p> <p>Execution Time October 2001</p>
<p>Client ENEL PRODUZIONE Area Nord Est Vittorio Veneto (TV)</p> <p>Property ENEL</p> <p>Place GARDONA (BL)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Revision of butterfly valve of a penstock DN 2000 (Gardona Hydroelectric Power Plant)</p> <p>Execution Time November 2001</p>
<p>Client COMPONENTI PRESSE S.P.A. PONT CANAVESE (TO)</p> <p>Property COMPONENTI PRESSE S.P.A.</p> <p>Place PONT CANAVESE (TO)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of n.3 Francis Turbines (power 630 kw) Net head 45 mt, Flow rate 1.500 l/s (each one)</p> <p>Execution Time December 2001</p>
<p>Client ENEL GREEN POWER PISA</p> <p>Property ENEL</p> <p>Place CAMPORE BASSO (TO)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of control system for a Francis Turbine (Campore Basso Hydroelectric Power Plant) n. 3 units</p> <p>Execution Time April 2002</p>

REFERENCE LIST



<p>Client ENEL PRODUZIONE Area Nord Est Vittorio Veneto (TV)</p> <p>Property ENEL</p> <p>Place AGORDO (BL)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Revision of butterfly valve of a penstock DN 2600 (Agordo Hydroelectric Power Plant)</p> <p>Execution time August 2002</p>
<p>Client ENEL GREEN POWER PISA</p> <p>Property ENEL</p> <p>Place RUSIA' (TO)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of control system for a Francis Turbine (Arsa Hydroelectric Power Plant) n. 1 unit</p> <p>Execution Time November 2002</p>
<p>Client ENEL GREEN POWER PISA</p> <p>Property ENEL</p> <p>Place CHIAMPERNOTTO (TO)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of control system for a Francis Turbine (Chiamperinotto Hydroelectric Power Plant) n. 1 unit</p> <p>Execution Time November 2002</p>
<p>Client ENEL GREEN POWER PISA</p> <p>Property ENEL</p> <p>Place PIANSOLETTI (TO)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of control system for a Francis Turbine (Piansoletti Hydroelectric Power Plant) n. 1 unit</p> <p>Execution Time Novembre 2002</p>
<p>Client ENEL GREEN POWER PISA</p> <p>Property ENEL</p> <p>Place DOMODOSSOLA (VB)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of control system for a Francis Turbine (Arsa Hydroelectric Power Plant) n. 2 units</p> <p>Execution Time December 2002</p>

REFERENCE LIST



<p>Client TERMOTECNICA COMMERCIALE (TV)</p> <p>Property CARLO MAGNANI</p> <p>Place PIEVE DI SOLIGO (TV)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of a Hydroelectric Power Plant with a Kaplan turbine, vertical axis, 60 KW, complete of all controls accessories and sluice gate of turbine interception.</p> <p>Execution time December 2002</p>
<p>Client ENEL GREEN POWER Pisa</p> <p>Property ENEL Produzione U.B. Priolo Gargallo (CA)</p> <p>Place Adrano (CA)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply and assembly of a new speed control and revision of hydraulic System of Control for a Francis Turbine (20.000 KW Unit 1 and unit 2 of Contrasto Hydroelectric Power Plant.</p> <p>Execution Time June 2003</p>
<p>Client ENEL PRODUZIONE Area Nord Est Vittorio Veneto (TV)</p> <p>Property ENEL</p> <p>Place LA STANGA (BL)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Revision of butterfly valve of a penstock DN 2600 (La Stanga Hydroelectric Power Plant)</p> <p>Execution Time August 2003</p>
<p>Client CIO SRL Lavorazioni meccaniche San Ambrogio (TO)</p> <p>Property CIO SRL</p> <p>Place PONT CANAVESE (TO)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Extraordinary maintenance of a Pelton Turbine with the supply of a new runner (700 kw)</p> <p>Execution Time December 2003</p>
<p>Client ENEL GREEN POWER PISA</p> <p>Property ENEL</p> <p>Place DOMODOSSOLA (VB)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of control systems for n.2 Pelton Turbines (Maccagno Hydroelectric Power Plant) Power 2 x 1500 Kw with switchboard and extraordinary maintenance of turbine.</p> <p>Execution Time February 2004</p>

REFERENCE LIST



<p>Client ENEL GREEN POWER PISA</p> <p>Property ENEL</p> <p>Place PIEDIMULERA (VB)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of a control system for a Vertical Francis Turbine (Piedimulera Hydroelectric Power Plant) complete of hydraulic unit and extraordinary maintenance of turbine.</p> <p>Execution time March 2004</p>
<p>Client CIO SRL Lavorazioni meccaniche San Ambrogio (TO)</p> <p>Property CIO SRL</p> <p>Place Avigliana (TO)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Remaking of stator and distributor with re generation Francis turbine runner (Power 550 kw)</p> <p>Execution Time October 2004</p>
<p>Client ENEL GREEN POWER PISA</p> <p>Property ENEL</p> <p>Place FORNOALLIONE (BG)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of control systems for n.2 Pelton Turbines (Fornoallione) Power 1200 kW with switchboards and extraordinary maintenance of the turbine</p> <p>Execution Time December 2004</p>
<p>Client AZIENDA ENERGETICA S.P.A. BOLZANO</p> <p>Property Azienda Energetica</p> <p>Place Cardano (BZ)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply and assembly of a new penstock DN1100 length 340 m with 4 expansion joints, butterfly valve and sluice gates</p> <p>Execution Time February 2005</p>
<p>Client ENEL GREEN POWER PISA</p> <p>Property ENEL</p> <p>Place CASSIBILE (CT)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of the control system for a Peton Turbine, 3000 kW (Cassibile Hydroelectric Power Plant) with switchboards and extraordinary maintenance of the turbine</p> <p>Execution Time March 2005</p>

REFERENCE LIST



<p>Client IDROELETTRICA ALTA VALCELLINA (PN)</p> <p>Property CODEN</p> <p>Place CLAUT (PN)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of a new Francis Group 630 kVA</p> <p>Execution time April 2005</p>
<p>Client G.I.R. S.P.A. GESTIONI INDUSTRIALI RIVAROLO</p> <p>Property G.I.R.</p> <p>Place Stroba (TO)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Replacement of generator for Francis Turbines (Power 550 kw) of Units 2 - 3 of Stroba Hydroelectric Power Plant with re generation of hydraulic controls units</p> <p>Execution Time June 2005</p>
<p>Client G.I.R. S.P.A. GESTIONI INDUSTRIALI RIVAROLO</p> <p>Property G.I.R.</p> <p>Place Stroba (TO)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Automation of n. 13 sluice gates (Stroba Hydroelectric Power Plant)</p> <p>Execution Time June 2005</p>
<p>Client ELETTROSTUDIO SRL MESTRE (VE)</p> <p>Property ELETTROSTUDIO</p> <p>Place Soglio (VI)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply and Assembly of a new Francis Group, horizontal axis, power 90 kw with sluice gate and controls components in HT and MT</p> <p>Execution Time July 2005</p>
<p>Client CONDEL SRL (TO)</p> <p>Property CONDEL SRL</p> <p>Place COLLEGNO (TO)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Regeneration of a Vertical Kaplan Turbine (power 280 kW) with the realization of the new blades.</p> <p>Execution Time September 2005</p>

REFERENCE LIST



<p>Client ALPAGO ENERGIA (BL)</p> <p>Property COMUNE DI ALLEGHE (BL)</p> <p>Place Ru' Col Aut</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of a Pelton Group with n. 1 injector (power 150 kW) complete of hydraulic control unit.</p> <p>Execution time October 2005</p>
<p>Client ENEL VITTORIO VENETO (TV)</p> <p>Property ENEL</p> <p>Place BRENTINO (VR)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Regeneration of runners and injectors for n. 3 Pelton Group and supply of a new control system.</p> <p>Execution Time February 2006</p>
<p>Client PASTIFICIO DE CECCO (CH)</p> <p>Property PASTIFICIO DE CECCO</p> <p>Place FARA SAN MARTINO /CH)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of two Francis Turbine Fornitura (550 KVA and 1100 KVA) complete of electrical equipments for the operation isolated</p> <p>Execution Time June 2006</p>
<p>Client VERLENGIA – DE CECCO SRL</p> <p>Property VERLENGIA – DE CECCO</p> <p>Place TARANTA PELIGNA (CH)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Revision of electrical and hydraulic equipments for n. 2 Francis Turbines (750 KVA)</p> <p>Execution Time February 2006</p>
<p>Client ILA MERLINO & C. SRL</p> <p>Property ILA MERLINO</p> <p>Place TARANTA PELIGNA (CH)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of a Kaplan Turbine, double regulation complete of electrical equipments (Power 80 kW)</p> <p>Execution Time June 2008</p>

REFERENCE LIST



<p>Client ALPAGO ENERGIA (BL)</p> <p>Property MOLINO CERERE SRL (TV)</p> <p>Place BIADENE (TV)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of a Kaplan turbine type S, simple regulation with electrical equipments (Power 150 kW)</p> <p>Execution time June 2008</p>
<p>Client ENEL NOVARA (NO)</p> <p>Property ENEL</p> <p>Place BROLO (VB)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Regeneration of runners and injectors for n. 3 Pelton Groups (1100 kW) and supply of a new control system.</p> <p>Execution Time March 2008</p>
<p>Client ENEL CUNEO (CN)</p> <p>Property ENEL</p> <p>Place BREOLUNGI (CN)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of a new hydraulic control system for n. 3 Francis Groups (1350 KW)</p> <p>Execution Time September 2007</p>
<p>Client ENEL TRENTO</p> <p>Property ENEL</p> <p>Place MALGA BOAZZO (TN)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of a new hydraulic servomotor for control of rotary valve penstock guardian. Diam. 490 mm race1000 mm</p> <p>Execution Time September 2007</p>
<p>Client IMPRESA PLONER SRL</p> <p>Property PROVINCIA AUTONOMA BOLZANO</p> <p>Place BRUNICO (BZ)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of special equipments for penstock DN1400 length 3000 m (Val Casies Hydroelectric Power Plant)</p> <p>Execution Time September 2007</p>

REFERENCE LIST



<p>Client MOLINO CERERE (TV)</p> <p>Property MOLINO CERERE</p> <p>Place BIADENE (TV)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of a new runner with a study of the hydraulic profiles for a Francis Turbine Fornitura (750 KVA) , remaking of the distributor and regeneration of rotative valve DN1200 PN6</p> <p>Execution time March 2008</p>
<p>Client ENEL VITTORIO VENETO (TV)</p> <p>Property ENEL</p> <p>Place FADALTO (TV)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of monitoring system for Francis Groups(Power 120.000 KW)</p> <p>Execution Time December 2007</p>
<p>Client ENEL VITTORIO VENETO (TV)</p> <p>Property ENEL</p> <p>Place SANTA MASSENZA (TN)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Extraordinary maintenance of runner (Power 70 MW) Santa Massenza Hydroelectric Power Plant</p> <p>Execution Time March 2008</p>
<p>Client COMUNE DI MALBORGHETTO (UD)</p> <p>Property COMUNE DI MALBORGHETTO</p> <p>Place UGOVIZZA (UD)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of a Pelton Turbine, horizontal axis with n. 2 injectors (Power 1.250 kVA)</p> <p>Execution Time November 2008</p>
<p>Client F.lli BARUZZI SPA (RA)</p> <p>Property CONSORZIO MEDIO CHIESE</p> <p>Place NUVOLENTA (BS)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of a Kaplan Turbine, horizontal axis with double regulation (Power 850 kVA)</p> <p>Execution Time June 2009</p>

REFERENCE LIST



<p>Client ASTOLFO DELLA LUNA SRL (CN)</p> <p>Property ASTOLFO DELLA LUNA</p> <p>Place AGLIE (TO)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of a Kaplan Turbine, horizontal axis with double regulation (Power 850 kVA) complete of control electrical equipments</p> <p>Execution time April 2010</p>
<p>Client ISPE SRL ROMA</p> <p>Property ISPE</p> <p>Place ISERNIA</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of n. 2 Francis Turbine, horizontal axis (Power 1250 kVA each one)</p> <p>Execution Time From March to November 2009</p>
<p>Client AIVA SRL (TO)</p> <p>Property AIVA SRL</p> <p>Place MEZZENILE (TO)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of a Pelton Turbine with 4 injectors, vertical axis with control electrical equipments (Power 1000 KVA)</p> <p>Execution Time June 2010</p>
<p>Client AIVA SRL (TO)</p> <p>Property AIVA SRL</p> <p>Place MEZZENILE (TO)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of a penstock DN600 complete of equipments for intake construction</p> <p>Execution Time June 2010</p>
<p>Client STER SRL (MI)</p> <p>Property STER SRL</p> <p>Place COSTONE (BG)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of n. 3 Francis Turbines, vertical axis, (Power 1600 kW each one) with electrical equipments of control.</p> <p>Execution Time December 2010</p>

REFERENCE LIST

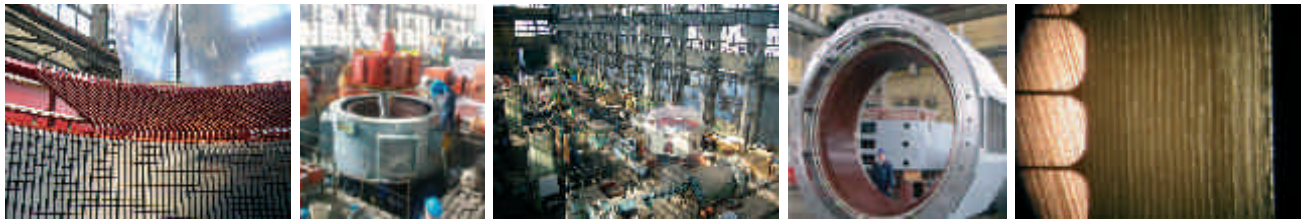


<p>Client STER SRL (MI)</p> <p>Property STER SRL</p> <p>Place PONTE NOSSA (BG)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of n. 2 Kaplan Turbines, vertical axis, (Power 1720 kW and 650 kW) with electrical equipments of control</p> <p>Execution time In Progress</p>
<p>Client CONSORZIO LEDRA TAGLIAMENTO (UD)</p> <p>Property CONSORZIO LEDRA TAGLIAMENTO (UD)</p> <p>Place PANNELLIA (UD)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of a Kaplan Turbine, horizontal axis, power 1400 kW with electrical equipments of control</p> <p>Execution Time In Progress</p>
<p>Client H2O ACQUA ENERGIA SRL (UD)</p> <p>Property CONSORZIO LEDRA TAGLIAMENTO (UD)</p> <p>Place CORMOR (UD)</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of a Kaplan Turbine, horizontal axis, power 370 kW with electrical equipments of control</p> <p>Execution Time In Progress</p>
<p>Client MWENGA HYDRO LIMITED</p> <p>Property MUFINDI TEA COMPANY LTD - TANZANIA</p> <p>Place IRINGA - TANZANIA</p>	<p>Sector Hydroelectric</p> <p>Type of supply / Intervention Supply of n. 1 Francis Turbine, vertical axis, power 5000 kVA with electrical equipments of control</p> <p>Execution Time In Progress</p>

ABOUT US



ELPROM-ZEM Co., a joint stock company, is the biggest manufacturer of electrical machines in Bulgaria and it is more than half-a-century long experience in their manufacturing. Its production is well known in all countries of CIS and East Europe, as well as in many West European countries, Asia, Africa and Latin America. The company employs more than 300 highly specialized employees and many customers rely on its services and backup to maintain their plant efficiency.



As a result of the changes, which occurred in The Bulgarian society and its orientation to the market economy, the company has been privatized in 1997 and 97% of its capital are private property. The main shareholder, possessing the control package of shares, is Industrial holding "BULGARIA".



ABOUT US



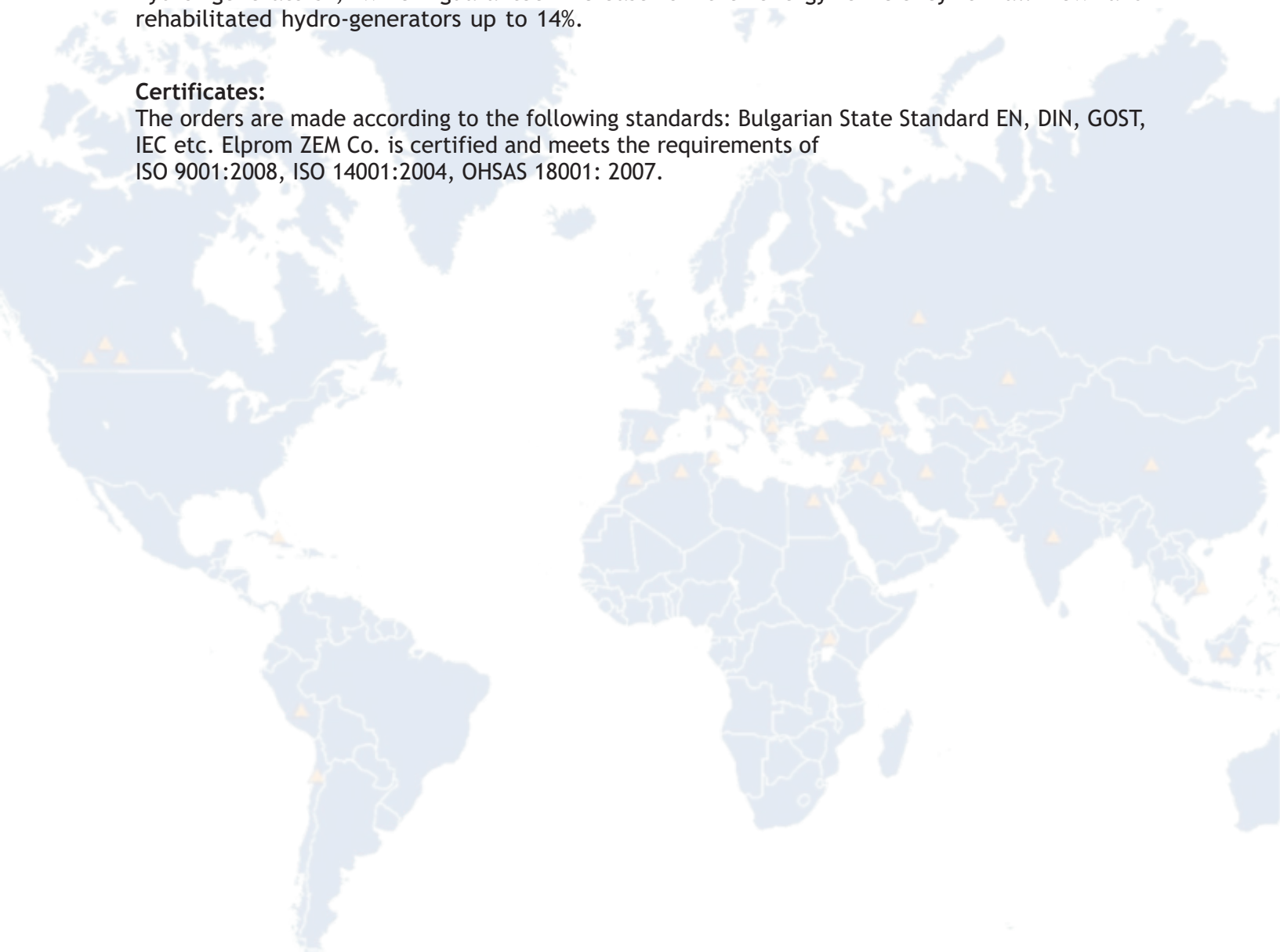
ELPROM-ZEM Co. produces and sells a wide range of Hydro generators up to 235 MVA power output, produced under license of TOSHIBA - Japan, and with TOSHIBA equipment, including equipment for final treatment of the insulation in vacuum and under pressure. More than 180 hydro power plants in Bulgaria and her neighboring countries and a few dozen abroad are equipped with successfully operating ELPROMZEM's hydro generators.



Elprom ZEM Co. acquired VPI technology to increase energy efficiency - a complete line for production of hydro generators' insulation called "GLOBAL VPI" (Vacuum Pressure Impregnation) system. This cutting edge technology is delivered from Germany and England to applied science and patent number 65201 stating a "New insulation system for high voltage stator winding for hydro generators", which guarantee increase of the energy efficiency of all new and rehabilitated hydro-generators up to 14%.

Certificates:

The orders are made according to the following standards: Bulgarian State Standard EN, DIN, GOST, IEC etc. Elprom ZEM Co. is certified and meets the requirements of ISO 9001:2008, ISO 14001:2004, OHSAS 18001: 2007.



MANUFACTURED HYDROGENERATORS FOR HPP and SHPP

No	Project	Country	Type of hydrogenerator	Rated power	Rated speed rotation	Rated voltage
Before 2003						
1	HPP "Ustovo"	Bulgaria	Horizontal synchronous	315 kVA	1000 min ⁻¹	0,4 kV
2	SHPP "Republic"	Bulgaria	Horizontal synchronous	180 kVA	1000 min ⁻¹	0,4 kV
3	HPP "Studena" HG 1	Bulgaria	Horizontal synchronous	500 kVA	1000 min ⁻¹	0,4 kV
4	HPP "Studena" HG 2	Bulgaria	Horizontal synchronous	500 kVA	1000 min ⁻¹	0,4 kV
5	HPP "Batoshevo" HG 1	Bulgaria	Horizontal synchronous	1000 kVA	750 min ⁻¹	0,6 kV
6	HPP "Batoshevo" HG 2	Bulgaria	Horizontal synchronous	1000 kVA	750 min ⁻¹	0,6 kV
7	HPP "Batoshevo" HG 3	Bulgaria	Horizontal synchronous	1000 kVA	750 min ⁻¹	0,6 kV
8	HPP "Barzia" HG1	Bulgaria	Horizontal synchronous	4000 kVA	500 min ⁻¹	6,3 kV
9	HPP "Barzia" HG2	Bulgaria	Horizontal synchronous	4000 kVA	500 min ⁻¹	6,3 kV
10	SHPP "Shoy Kun" HG1	Vietnam	Horizontal synchronous	520 kVA	750 min ⁻¹	6,3 kV
11	SHPP "Shoy Kun" HG1	Vietnam	Horizontal synchronous	520 kVA	750 min ⁻¹	6,3 kV
12	SHPP "St. Zagora"	Bulgaria	Horizontal synchronous	150 kVA	1000 min ⁻¹	0,4 kV
13	Hyundai Heavy Industries	Bulgaria	Horizontal synchronous	1500 kVA	500 min ⁻¹	3,15 kV
14	SHPP "Kailaka"	Bulgaria	Horizontal synchronous	110 kVA	500 min ⁻¹	0,4 kV
15	SHPP "Cherni vit"	Bulgaria	Horizontal synchronous	450 kVA	600 min ⁻¹	6,3 kV
16	HPP "Hr. Smirnenski"	Bulgaria	Horizontal synchronous	475 kVA	750 min ⁻¹	0,4 kV
17	HPP "Samoranovo"	Bulgaria	Horizontal synchronous	3300 kVA	750 min ⁻¹	6,3 kV
18	Hyundai Heavy Industries	Bulgaria	Horizontal synchronous	7500 kVA	750 min ⁻¹	6 kV
19	SHPP	Vietnam	Horizontal synchronous	520 kVA	750 min ⁻¹	6,3 kV
20	Diesel Agregat	Bulgaria	Horizontal synchronous	625 kVA	500 min ⁻¹	0,4 kV
21	Diesel Agregat	Bulgaria	Horizontal synchronous	1650 kVA	750 min ⁻¹	6,3 kV
22	SHPP	Cuba	Horizontal synchronous	100/200 kVA	900/800 min ⁻¹	0,4 kV
23	Diesel Agregat	Bulgaria	Horizontal synchronous	750 kVA	500 min ⁻¹	6,3 kV
24	HPP "Popina laka" HG1	Bulgaria	Horizontal synchronous	12250 kVA	600 min ⁻¹	10,5 kV
25	HPP "Popina laka" HG2	Bulgaria	Horizontal synchronous	12250 kVA	600 min ⁻¹	10,5 kV
26	HPP "Cherni Osam"	Bulgaria	Horizontal synchronous	1250 kVA	750 min ⁻¹	6,3 kV
27	Energoremont	Bulgaria	Horizontal synchronous	2500 kVA	750 min ⁻¹	6,3 kV
28	Energoremont	Bulgaria	Horizontal synchronous	500 kVA	750 min ⁻¹	6,3 kV
29	SHPP Shien-Hgam HG1	Vietnam	Horizontal synchronous	1260 kVA	750 min ⁻¹	6,3 kV
30	SHPP Shien-Hgam HG2	Vietnam	Horizontal synchronous	1260 kVA	750 min ⁻¹	6,3 kV
31	SHPP "Suoi-Hua" HG1	Vietnam	Horizontal synchronous	750 kVA	600 min ⁻¹	6,3 kV
32	SHPP "Suoi-Hua" HG2	Vietnam	Horizontal synchronous	750 kVA	600 min ⁻¹	6,3 kV
33	SHPP "Chiprovtsi"	Bulgaria	Horizontal synchronous	800 kVA	750 min ⁻¹	6,3 kV
34	Hyundai Heavy Industries	Bulgaria	Horizontal synchronous	3500 kVA	1500 min ⁻¹	6,3 kV
35	Hyundai Heavy Industries	Bulgaria	Horizontal synchronous	30000 kVA	750 min ⁻¹	6,3 kV
36	HPP "Mozgiovitza" HG1	Bulgaria	Horizontal synchronous	6300 kVA	500 min ⁻¹	6,3 kV
37	HPP "Mozgiovitza" HG2	Bulgaria	Horizontal synchronous	6300 kVA	500 min ⁻¹	6,3 kV

MANUFACTURED HYDROGENERATORS FOR HPP and SHPP

No	Project	Country	Type of hydrogenerator	Rated power	Rated speed rotation	Rated voltage
38	HPP "Spanchevo" HG1	Bulgaria	Horizontal synchronous	16000 kVA	428,6 min ⁻¹	10,5 kV
39	HPP "Spanchevo" HG2	Bulgaria	Horizontal synchronous	16000 kVA	428,6 min ⁻¹	10,5 kV
40	HPP "Pirin" HG1	Bulgaria	Horizontal synchronous	12500 kVA	500 min ⁻¹	10,5 kV
41	HPP "Pirin" HG2	Bulgaria	Horizontal synchronous	12500 kVA	500 min ⁻¹	10,5 kV
42	Laboratoiy - EE	Bulgaria	Horizontal synchronous	800 kVA	1500 min ⁻¹	0,4 kV
43	Test station-EE	Bulgaria	Horizontal synchronous	1600 kVA	600 min ⁻¹	6 kV
44	Test station-EE	Bulgaria	Horizontal synchronous	2500 kVA	750 min ⁻¹	6 kV
45	HPP "Hr.Smirenski"	Bulgaria	Horizontal synchronous	475 kVA	750 min ⁻¹	0,4 kV
46	HPP "Topolnitza" HG1	Bulgaria	Vertical synchronous	4000 kVA	500 min ⁻¹	6,3 kV
47	HPP "Topolnitza" HG2	Bulgaria	Vertical synchronous	4000 kVA	500 min ⁻¹	6,3 kV
48	HPP "Topolnitza" HG3	Bulgaria	Vertical synchronous	4000 kVA	500 min ⁻¹	6,3 kV
49	SHPP "Rakita" HG1	Bulgaria	Vertical synchronous	3160 kVA	600 min ⁻¹	6,3 kV
50	SHPP "Rakita" HG2	Bulgaria	Vertical synchronous	3160 kVA	600 min ⁻¹	6,3 kV
51	SHPP 1÷30	China	Vertical synchronous	2000 kVA	300 min ⁻¹	6,3 kV
52	HPP "Rositza" HG1	Bulgaria	Vertical synchronous	2000 kVA	500 min ⁻¹	6,3 kV
53	HPP "Rositza" HG2	Bulgaria	Vertical synchronous	2000 kVA	500 min ⁻¹	6,3 kV
54	HPP "Pasarel"	Bulgaria	Vertical synchronous	5000 kVA	750 min ⁻¹	10,5 kV
55	ENR	Bulgaria	Vertical synchronous	6600 kVA	300 min ⁻¹	6,3 kV
56	HPP "Jrebchevo" 1	Bulgaria	Vertical synchronous	8300 kVA	300 min ⁻¹	6,3 kV
57	HPP "Rakita"	Bulgaria	Vertical synchronous	3160 kVA	600 min ⁻¹	6,3 kV
58	HPP "Hathal"		Vertical synchronous	1870 kVA	250 min ⁻¹	6,3 kV
59	HPP "Teshel" HG1	Bulgaria	Vertical synchronous	35300 kVA	500 min ⁻¹	10,5 kV
60	HPP "Teshel" HG2	Bulgaria	Vertical synchronous	35300 kVA	500 min ⁻¹	10,5 kV
61	SHPP "Kam Son" HG1	Vietnam	Vertical synchronous	2200 kVA	500 min ⁻¹	6,3 kV
62	SHPP "Kam Son" HG2	Vietnam	Vertical synchronous	2200 kVA	500 min ⁻¹	6,3 kV
63	SHPP "Kam Son" HG3	Vietnam	Vertical synchronous	2200 kVA	500 min ⁻¹	6,3 kV
64	HPP "Vacha" ÆHG 1	Bulgaria	Vertical synchronous	4120 kVA	750 min ⁻¹	6,3 kV
65	HPP "Vacha" ÆHG 2	Bulgaria	Vertical synchronous	4120 kVA	750 min ⁻¹	6,3 kV
66	HPP "Krichim" HG1	Bulgaria	Vertical synchronous	48000 kVA	428 min ⁻¹	10,5 kV
67	HPP "Krichim" HG2	Bulgaria	Vertical synchronous	48000 kVA	428 min ⁻¹	10,5 kV
68	HPP "Sestrimo" HG1	Bulgaria	Vertical synchronous	145000 kVA	333,3 min ⁻¹	10,5 kV
69	HPP "Sestrimo" HG2	Bulgaria	Vertical synchronous	145000 kVA	333,3 min ⁻¹	10,5 kV
70	HPP "Lilianovo" HG1	Bulgaria	Vertical synchronous	11750 kVA	428 min ⁻¹	10,5 kV
71	HPP "Lilianovo" HG2	Bulgaria	Vertical synchronous	11750 kVA	428 min ⁻¹	10,5 kV
72	HPP "Sandanski" HG1	Bulgaria	Vertical synchronous	8900 kVA	375 min ⁻¹	6,3 kV
73	HPP "Sandanski" HG2	Bulgaria	Vertical synchronous	8900 kVA	375 min ⁻¹	6,3 kV
74	HPP "Devin" HG1	Bulgaria	Vertical synchronous	45000 kVA	375 min ⁻¹	10,5 kV

MANUFACTURED HYDROGENERATORS FOR HPP and SHPP

No	Project	Country	Type of hydrogenerator	Rated power	Rated speed rotation	Rated voltage
75	HPP "Devin" HG2	Bulgaria	Vertical synchronous	45000 kVA	375 min ⁻¹	10,5 kV
76	HPP "Momina klisura" HG2	Bulgaria	Vertical synchronous	67000 kVA	300 min ⁻¹	10,5 kV
77	HPP "Borislavtzi"	Bulgaria	Vertical synchronous	10500 kVA	166,7 min ⁻¹	10,5 kV
78	SHPP "Hasake" HG1	Syria	Vertical synchronous	7500 kVA	250 min ⁻¹	6,3 kV
79	SHPP "Hasake" HG2	Syria	Vertical synchronous	7500 kVA	250 min ⁻¹	6,3 kV
80	HPP "Chaira" HG1	Bulgaria	Vertical synchronous	235000 kVA	600 min ⁻¹	19 kV
81	HPP "Chaira" HG2	Bulgaria	Vertical synchronous	224000 kVA	600 min ⁻¹	19 kV
82	Elgeningenering	Bulgaria	Horizontal asynchronous	1000 kW	1000 min ⁻¹	6 kV
			2003			
83	HPP "Jrebchevo" 2	Bulgaria	Horizontal asynchronous	630 kW	750 min ⁻¹	6,3 kV
84	SHPP "Elgen"	Bulgaria	Horizontal asynchronous	205 kW	760 min ⁻¹	0,4 kV
85	SHPP "Retije 1"	Bulgaria	Horizontal synchronous	2200 kVA	750 min ⁻¹	6,3 kV
86	SHPP "Retije 2"	Bulgaria	Horizontal asynchronous	800 kW	1000 min ⁻¹	6,3 kV
87	SHPP "Retije 3"	Bulgaria	Horizontal synchronous	5300 kVA	750 min ⁻¹	6,3 kV
88	SHPP "BIERI"	Switzerland	Horizontal asynchronous	70 kW	750 min ⁻¹	0,4 kV
			2004			
89	SHPP "Katuntzi"	Bulgaria	Horizontal synchronous	3700 kVA	750 min ⁻¹	6,3 kV
90	SHPP "Pasival"	Bulgaria	Horizontal asynchronous	6x500 kW	1000 min ⁻¹	6,3 kV
91	SHPP "Kashina"	Bulgaria	Horizontal asynchronous	470 kW	750 min ⁻¹	0,4 kV
92	SHPP "Iarchova skala"	Bulgaria	Horizontal asynchronous	670 kW	1000 min ⁻¹	0,4 kV
			2005			
93	SHPP "Vlahi Pishev"	Bulgaria	Horizontal synchronous	1050 kVA	1000 min ⁻¹	6,3 kV
94	SHPP "BIERI"	Switzerland	Horizontal asynchronous	220 kW	1000 min ⁻¹	0,42 kV
95	SHPP "Vlahi"	Bulgaria	Horizontal synchronous	1300 kVA	1000 min ⁻¹	6,3 kV
96	SHPP "Garvanitza"	Bulgaria	Horizontal synchronous	1250 kVA	1000 min ⁻¹	6,3 kV
97	SHPP "Etropole" E	Bulgaria	Horizontal asynchronous	300 kW	1000 min ⁻¹	6 kV
98	SHPP "Etropole" B	Bulgaria	Horizontal asynchronous	300 kW	1000 min ⁻¹	6 kV
99	SHPP "Mikrevo"	Bulgaria	Horizontal asynchronous	1500 kW	1500 min ⁻¹	6 kV
100	SHPP "Vodemil"	Bulgaria	Horizontal asynchronous	400 kW	600 min ⁻¹	0,4 kV
			2006			
101	SHPP "Ticha"	Bulgaria	Horizontal asynchronous	2150 kW	600 min ⁻¹	6,3 kV
102	SHPP "Rabisha"	Bulgaria	Horizontal synchronous	1250 kVA	1000 min ⁻¹	6,3 kV
103	HPP "Iegezis"	Armenia	Vertical synchronous	7750 kVA	600 min ⁻¹	6,3 kV
104	HPP "Iahinovo"	Bulgaria	Horizontal synchronous	7660 kVA	750 min ⁻¹	6,3 kV
105	HPP "Vlahi"	Bulgaria	Horizontal synchronous	1300 kVA	1000 min ⁻¹	6,3 kV
106	SHPP "St. Zagora"1	Bulgaria	Horizontal asynchronous	320 kW	1500 min ⁻¹	0,4 kV
107	SHPP "St. Zagora"2	Bulgaria	Horizontal asynchronous	200 kW	1500 min ⁻¹	0,4 kV

MANUFACTURED HYDROGENERATORS FOR HPP and SHPP

No	Project	Country	Type of hydrogenerator	Rated power	Rated speed rotation	Rated voltage
2007						
107	SHPP "Manastirska"	Bulgaria	Vertical asynchronous	450 kW	600 min ⁻¹	0,4 kV
108	SHPP "Hubcha" E	Bulgaria	Horizontal asynchronous	100 kW	750 min ⁻¹	0,4 kV
109	SHPP "Belvi"	Bulgaria	Horizontal asynchronous	300 kW	1500 min ⁻¹	0,4 kV
110	SHPP "Hubcha" B	Bulgaria	Horizontal asynchronous	220 kW	1000 min ⁻¹	0,4 kV
111	SHPP "Porominovo"	Bulgaria	Horizontal asynchronous	1120 kW	600 min ⁻¹	6,3 kV
112	HPP "Kamenitza"	Bulgaria	Horizontal asynchronous	1050 kW	1000 min ⁻¹	6,3 kV
113	SEEE "Hradistko" HG1	Czech Rep.	Vertical synchronous	1480 kW	75 min ⁻¹	6,3 kV
114	SEEE "Kostomlatko" HG1	Czech Rep.	Vertical synchronous	1480 kW	75 min ⁻¹	6,3 kV
115	SHPP "Chair dere"	Bulgaria	Horizontal synchronous	1220 kVA	1000 min ⁻¹	6,3 kV
116	SHPP "Belvi"	Bulgaria	Horizontal asynchronous	300 kW	1500 min ⁻¹	0,4 kV
2008						
117	SEEE "Hradistko" HG2	Czech Rep.	Vertical synchronous	1480 kW	75 min ⁻¹	6,3 kV
118	SEEE "Kostomlatko" HG2	Czech Rep.	Vertical synchronous	1480 kW	75 min ⁻¹	6,3 kV
119	SHPP "Djerman"	Bulgaria	Horizontal synchronous	3300 kVA	600 min ⁻¹	6,3 kV
120	SHPP "Slavova"	Bulgaria	Horizontal synchronous	1840 kVA	750 min ⁻¹	6,3 kV
121	SHPP "Uhlowitza"	Bulgaria	Horizontal asynchronous	250 kW	750 min ⁻¹	0,4 kV
122	SHPP "Chair Dere" B	Bulgaria	Horizontal asynchronous	420 kW	1000 min ⁻¹	0,4 kV
123	SHPP "Treshtena"	Bulgaria	Horizontal asynchronous	1060 kW	750 min ⁻¹	6,3 kV
124	SHPP "Konal"-HG1	India	Vertical synchronous	6111 kVA	600 min ⁻¹	6,3 kV
2009						
125	HPP "Studen kladenetz" HG5	Bulgaria	Vertical synchronous	23 000 kVA	300 min ⁻¹	10,5 kV
126	HPP "Tzankov kamak" HG1	Bulgaria	Vertical synchronous	50 000 kVA	428,6 min ⁻¹	10,5 kV
127	HPP "Tzankov kamak" HG2	Bulgaria	Vertical synchronous	50 000 kVA	428,6 min ⁻¹	10,5 kV
128	HPP "Bugoye"-HG1	Uganda	Horizontal synchronous	8400 kVA	600 min ⁻¹	6,6 kV
129	SHPP "Konal"-HG2	India	Vertical synchronous	6111 kVA	600 min ⁻¹	6,3 kV
130	HPP "Upper Clowhom"	Canada	Vertical synchronous	12250 kVA	300 min ⁻¹	13,8 kV
131	HPP "Bugoye"-HG2	Uganda	Horizontal synchronous	8400 kVA	600 min ⁻¹	6,6 kV
132	SHPP "Serpentine"	Canada	Vertical synchronous	11400 kVA	600 min ⁻¹	13,8 kV
133	SHPP "Clemina"	Canada	Vertical synchronous	12295 kVA	720 min ⁻¹	13,8 kV
134	SHPP "Ianovo"	Bulgaria	Horizontal asynchronous	900 kW	1500 min ⁻¹	6 kV
135	SHPP "Katuntzi"	Bulgaria	Horizontal asynchronous	900 kW	1500 min ⁻¹	6 kV
136	HPP "Bl. Bistritza" HG1	Bulgaria	Vertical synchronous	1250 kVA	500 min ⁻¹	6,3 kV
137	HPP "Bl. Bistritza" HG2	Bulgaria	Vertical synchronous	1600 kVA	500 min ⁻¹	6,3 kV
138	HPP "Bl. Bistritza" HG3	Bulgaria	Vertical synchronous	1160 kVA	428,6 min ⁻¹	6,3 kV
139	HPP "Bl. Bistritza" HG4	Bulgaria	Horizontal asynchronous	650 kW	600 min ⁻¹	0,4 kV
140	HPP "Bl. Bistritza" HG5	Bulgaria	Horizontal asynchronous	650 kW	600 min ⁻¹	0,4 kV
141	HPP "Bl. Bistritza" HG6	Bulgaria	Horizontal asynchronous	700 kW	500 min ⁻¹	0,4 kV

MANUFACTURED HYDROGENERATORS FOR HPP and SHPP

No	Project	Country	Type of hydrogenerator	Rated power	Rated speed rotation	Rated voltage
2007						
142	HPP"Bl.Bistritza" HG7	Bulgaria	Horizontal synchronous	600 kW	1000 min	0,4 kV
143	HPP"Bl.Bistritza" HG8	Bulgaria	Horizontal synchronous	600 kW	1000 min	0,4 kV
144	SHPP "BIERI"1	Switzerland	Horizontal asynchronous	5 kW	1500 min	0,4 kV
145	SHPP "BIERI"2	Switzerland	Horizontal asynchronous	19 kW	1500 min	0,4 kV
146	SHPP "BIERI"3	Switzerland	Horizontal asynchronous	23 kW	1500 min	0,4 kV
147	SHPP "Belvi"	Bulgaria	Horizontal asynchronous	300 kW	1500 min	0,4 kV
148	SHPP "Kostena"	Bulgaria	Horizontal asynchronous	550 kW	1000 min	0,4 kV
149	SHPP "Kamenitza" 1	Bulgaria	Horizontal asynchronous	1200 kW	750 min	6,3 kV

Hydrogenerators in manufacturing

Actual assembly hydrogenerators

REHABILITATION OF HYDROGENERATORS BY ELPROM ZEM CO.

No	Project	Investor	Repair Activities
1992 - 1997			
1	HPP "Shpile"	ESM-E EcEdEnia	New stator core and stator winding HG1, HG2 and HG3
2	HPP "EEshel"	NEK -Bulgaria	New stator core and stator winding HG1 and HG2
3	HPP "Devin"	NEK -Bulgaria	New stator core and stator winding HG1
4	HPP "Krichim"	NEK -Bulgaria	New stator core and stator winding HG1
1998			
5	HPP "Batak"	NEK -Bulgaria	Repair of HG1 14 poles
6	HPP "Mala Tzarkva"	NEK -Bulgaria	New stator core
7	HPP "Krichim"	NEK -Bulgaria	Repair of HG 2
8	HPP "Momina klisura"	NEK -Bulgaria	New stator core and stator winding HG2
1999			
9	HPP "Batak"	NEK -Bulgaria	Repair of HG4 14 poles
10	HPP "Pasarel"	Mecamidi - France	Repair of HG1rotor
11	HPP "Pasarel"	Mecamidi - France	Repair of HG1 8 pole coils
12	HPP "Devin"	NEK -Bulgaria	New stator core and stator winding HG2
2000			
13	HPP "Sestrimo"	NEK -Bulgaria	Repair of HG1 stator winding
14	HPP "Batak"	NEK -Bulgaria	Repair of HG2 14 poles
2001			
15	HPP "Batak"	NEK -Bulgaria	Repair of HG1 stator winding
16	HPP "Batak"	NEK -Bulgaria	Repair of HG2 rotors coils
17	HPP "Eleko"	NEK -Bulgaria	New stator core and stator winding HG1
18	HPP "Eardjali"	NEK -Bulgaria	New stator core and stator winding HG2
19	HPP "EEprinka"	Energopro -Bulgaria	Rehabilitation of HG
20	HPP "Sestrimo"	NEK -Bulgaria	New stator core and stator winding HG2
2002			
21	HPP "Sestrimo"	NEK -Bulgaria	New stator core and stator winding HG1
22	HPP "Chaira"	NEK -Bulgaria	Rehabilitation of HG 3
2003			
23	HPP "Barzia"	Energopro	New stator core and stator winding HG2
24	HPP "Eleko"	NEK -Bulgaria	New stator core and stator winding HG2 and HG3
25	HPP "Momina klisura"	NEK -Bulgaria	New stator core and stator winding HG1
26	HPP "Chaira"	NEK -Bulgaria	Repair of HG1, HG2 and HG3 pole coils
27	HPP "Chaira"	NEK -Bulgaria	Manufacturing of spare stator winding
28	HPP "Peshtera"	NEK -Bulgaria	New stator core and stator winding HG3
29	HPP "Lilqnovovo"	Energopro	Rehabilitation of HG 1
30	HPP "Lilqnovovo"	Energopro	Rehabilitation of HG 2
31	SHPP "Popina laka"	NEK -Bulgaria	Rehabilitation of HG 1
2004			
32	HPP "Ivailovgrad"	NEK -Bulgaria	Rehabilitation of HG2 stator magnatic core, stator winding and rotor
33	SHPP "Popina laka"	NEK -Bulgaria	Rehabilitation of HG 2
34	HPP "Sandanski"	Energopro	Rehabilitationof HG2 stator magnatic core, stator winding and rotor
35	HPP "Sandanski"	Energopro	Rehabilitation of HG 1 rotor

REHABILITATION OF HYDROGENERATORS BY ELPROM ZEM CO.

No	Project	Investor	Repair Activities
2005			
36	HPP "EEpolnitsa"	NEK -Bulgaria	Repair of HG2 lower bracket and foundation plates
37	HPP "Eardjali"	NEK -Bulgaria	Rehabilitation of HG1, HG3 and HG4 stator and poles
38	HPP "Krichim"	NEK -Bulgaria	Rehabilitation of HG2 pole coils
39	HPP "Momina klisura"	NEK -Bulgaria	HG1 balancing rotor and aircoolers
40	HPP "Eleko"	NEK -Bulgaria	Manufacturing of HG1, HG2 and HG3 20 pcs copper bars
41	HPP "Krichim"	NEK -Bulgaria	HG2 hydro-vacum pressing of 56 pcs. copper bars
42	HPP "Spanchevo"	HPP "Energia"	Rehabilitation of HG exciting system of HG
43	HPP "Samoranovo"	HPP "Energia"	Rehabilitation of HG
44	HPP "Ivailovgrad"	NEK -Bulgaria	Manufacturing of HG1and HG3 new stator winding
45	HPP "Lesichovo"	Delektra	Rehabilitation
46	HPP "Gbolchitza"	E EcEdEnia	New rotor core
2006			
47	HPP "Beli Iskar"	NEK -Bulgaria	Repair of HG1 stator winding
48	HPP "Krichim"	NEK -Bulgaria	Design, manufactory and replacement of water coolers for HG 1
49	HPP "Krichim"	NEK -Bulgaria	New stator winding
50	HPP "Peshtera"	NEK -Bulgaria	Rehabilitation of HG5 stator magnatic core, stator winding and rotor
51	HPP "Belmeken"	NEK -Bulgaria	New stator winding of HG1
52	HPP "Lanabregas"	Albania	Pe habilitation of HG
53	HPP "Chaira"	NEK -Bulgaria	Repair of stator winding
54	HPP "Krichim"	NEK -Bulgaria	Repair of poles
55	HPP "Krichim"	NEK -Bulgaria	Partial repair of HG
56	HPP "Krichim"	NEK -Bulgaria	Manufacturing of new spare, stator winding
57	SHPP "E ikrevo"	Eco-Electric-Bulgaria	Repair of AGA 99/72-4
58	HPP "E gosta"	Mecamidi - France	Repair of HG1
59	HPP "EEinare"	HPP "Energia"	New stator core of HG1
60	SHPP "Garvanitza"		Static exciting system of HG
2007			
61	HPP "Vacha"	NEK -Bulgaria	Rehabilitation of HG2 stator and poles of rotor
62	HPP "Studen kladenetz"	NEK -Bulgaria	Rehabilitation of HG1 stator and poles of rotor
63	HPP "Belmeken"	NEK -Bulgaria	Manufacturing of HG2 new stator winding
64	HPP "Eardjali"	NEK -Bulgaria	Rehabilitation of HG1 stator magnatic core, stator winding and poles
65	HPP "Peshtera"	NEK -Bulgaria	Rehabilitation of HG2 stator magnatic core, stator winding and poles
66	HPP "Ivailovgrad"	NEK -Bulgaria	Rehabilitation of HG2 stator magnatic core, stator winding and poles
2008			
67	HPP "Ivailovgrad"	NEK -Bulgaria	Rehabilitation of HG -stator
68	HPP "Eardjali"	NEK -Bulgaria	Rehabilitation of HG3 stator magnatic core, stator winding
69	HPP "Studen kladenetz"	NEK -Bulgaria	Rehabilitation of HG1, HG2, HG3 and HG4 stator magnatic core, stator winding- coppes bar mode
70	HPP "Belmeken"	NEK -Bulgaria	Manufacturing of HG3 new stator winding
71	HPP "Peshtera"	NEK -Bulgaria	Rehabilitation of HG1 stator magnatic core, stator winding and poles of rotor
72	HPP "Chaira"	NEK -Bulgaria	Rehabilitation of stator winding connections of HG3
2009			
73	HPP "Belmeken"	NEK -Bulgaria	Manufacturing of HG4 new stator winding
74	HPP "Peshtera"	NEK -Bulgaria	Rehabilitation of HG4 stator magnatic core, stator winding and poles of rotor
75	HPP "Eardjali"	NEK -Bulgaria	Rehabilitation of HG4 stator magnatic core, stator winding
76	HPP "Studen kladenetz"	NEK -Bulgaria	Rehabilitation of HG1stator and poles of rotor

**TSANKOV KAMAK HYDRO POWER STATION
STUDEN KLADENETS HYDRO POWER STATION
REPUBLIC OF BULGARIA**

Reference Letter

To Whom It May Concern,

Reference is made to the bilateral Memorandum of Understanding among the REPUBLIC OF BULGARIA and the REPUBLIC OF AUSTRIA, to work with joint efforts on the implementation of the large scale Hydro Power Stations in Bulgaria, namely the TSANKOV KAMAK HYDRO POWER STATION and the STUDEN KLADENETS.

Cooperation has been formed among ANDRITZ HYDRO GmbH of Austria and ELPROM ZEM of Bulgaria Co. to achieve this challenging target and carry out the implementation work of the Synchronous Generators for the said Hydro Power Stations.

Whereas ANDRITZ HYDRO GmbH acted as the Main Contractor towards the Employer NATIONAL ELECTRIC COMPANY of Bulgaria and ELPROM ZEM Co. acted as the Sub-Contractor for certain assigned Generator Components and Generator Key Components.

The work performed by ELPROM ZEM was carried out under the direct supervision of ANDRITZ HYDRO and comprised Detail Design, Procurement, Manufacturing and Installation of the assigned Generator Components.

Technical Main Data of the TSANKOV KAMAK Hydro Generators (2 Units):

- Nominal power **$S_n = 50$ MVA**
- Nominal voltage **$U_n = 10.5$ kV**
- Power factor **$\cos\varphi = 0.85$**
- Frequency **$f = 50$ Hz**
- Nominal rotation speed **$n = 428,6$ 1/min**

Technical Main Data of the STUDEN KLADENETS Hydro Generators (1 Unit):

- Nominal power **$S_n = 23$ MVA**
- Nominal voltage **$U_n = 10.5$ kV**
- Power factor **$\cos\varphi = 0.85$**
- Frequency **$f = 50$ Hz**
- Nominal rotation speed **$n = 300$ 1/min**

The work performed by ELPROM ZEM Co. was successfully completed and has met the anticipated project targets. The work was carried out with professionalism and in a pleasant working environment among all involved project team members.

Weiz, 25th Feb. 2010


Karl Scherer

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Karem Köpke



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