



Balkan Energy Solutions Team

Since December 2003

More Energy

-Monthly Balkan Energy Solutions Team (BEST) e-mail bulletin in power systems, renewable energy sources, electricity market and ecology -

February 2003

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office@balkanenergy.com

-based on voluntary work-

No 2 bulletin topic – More Energy

Contents:

| | |
|--------------------|----|
| Introduction | 1 |
| New in BEST | 1 |
| Power Systems | 1 |
| Wind Energy | 5 |
| Energy Efficiency | 8 |
| Solar Energy | 10 |
| Ecology | 12 |
| Electricity market | 14 |
| Hydro Energy | 15 |

Introduction

Dear colleagues this is second issue of BEST bulletin with aim to popularize power engineering and ecology, businesses and research in energy sector, to support ecology in every sense and to help in enlarging practical knowledge on renewable energy technologies on Balkans.

The first number of BEST bulletin has found great acceptance among colleagues, experts and interested parties what gave us **more energy**, so today it's English language edition is delivered to colleagues in more than 20 countries.

This bulletin is predicted to be recession free but the point is put on the information and contact. Therefore to make this bulletin usable around the globe BEST decide to publish it in English and Serbian language (Serbian is understood in most of Balkan countries).

The idea of the BEST bulletin has found support among public and therefore we strong support You to give **more energy** and send us Your materials, to leave Your contact and in that way BEST can help You. THANK YOU IN ADVANCE! /BEST/

New in BEST

BEST is planning to publish a book on Serbian and English language about electricity markets with titel »Power Exchanges and Balkan's perspectives«. We invite all companies and firms interested to sponorse this book edition and to put their commercials into the

book to contact us on office@balkanenergy.com. Book will probably be published in May.

BEConsultingT

Since February: **Balkan Energy Consulting Team (BECT)**. Balkan

Energy Consulting Team is power engineering oriented, business independent and time efficient customer service. BECT is constantly seeking for experts and young professionals from various areas in science and technology to be entered in BESC database for consulting activities. If You are interested please send Your CV to consulting@balkanenergy.com.

From January 2004, BEST together with VIBILIA (www.vibilia.co.yu) placed to the webpage www.balkanenergy.com daily up-to-date information on tenders, news and reports from the Balkans sorted by groups (Hydro, Wind, Solar, Biomass, Gas, and Electricity markets, Ecology, Education, Power Systems Transmission and Distribution). Everybody gets one month free access to full tender information by registering on www.balkanenergy.com/etenders

BEST is planning to organize several lectures from the area of free electricity markets, deregulation of power sector, renewable energy sources. We would like to make an interests investigation for such lectures and therefore if you have interests in lecturing, listening or opinion about this idea please be free to contact us at office@balkanenergy.com. Thank You in Advance! /BEST/.

Power Systems

WS Atkins Consultants Ltd



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ATKINS

For BEST: Vukan Polimac, MSc.EE
Principal Consultant,
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Our vision is to be the international, first choice supplier of technical services and integrated solutions.

Atkins (WS Atkins plc) is one of the world's leading providers of professional, technologically-based consultancy and support services. Atkins provides services for a wide range of public sector organizations and blue chip private sector companies. Atkins' operations are based in some 130 offices throughout the UK, and a further 70 offices providing consultancy services in Continental Europe, the Middle East, Asia Pacific and the Americas. Today, we generate an annual turnover in excess of £800m and employ over 15,000 staff.

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The projects for which we recently provided technical and business management assistance were related to Pool 1 and Pool 2 in Serbia, Interconnection of the power systems of the countries in the Balkan region as well as

privatisation of two distribution companies in Romania.

Our engineers gained experience not only in the Eastern and Central Europe but also in the well advanced countries in privatisation in Europe, Australia, Asia and America.

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THE NEW MICRONET – POWER SYSTEM LABORATORY

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Vladimir Krnajski, Power Industry of Serbia, Transmission Co "Elektroistok", Belgrade, Serbia



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Since December 2003

Dejan Raca, University of Wisconsin, Madison, WI, USA

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Following good experience from the past and new conditions and tasks for operation of physical dynamic models in the modern power engineering practice Power system laboratory – the New Micronet is formed and installed at University of Banja Luka, Bosnia and Herzegovina. Evaluating new, specific role of the New Micronet it is decided that it can be build with less machines then it's predecessor, but that it has to be equipped with complete information system. Micronet can be used for education of students and beginner engineers, training of working professionals, testing of new and old apparatus and for fundamental studies of dynamical behavior of Electric Power System and its components.

Development of mathematical models and simulation computer programs for power system analysis has limited usage of dynamic models for specific purposes, prioritely to experiments in transient processes. Micronet is suitable for testing of computer simulation programs, protective relays and SCADA systems. These experiments would be expensive and could lead to major accidents if conducted on real system. At the same time experiments conducted in laboratory equipped with dynamic model is reliable since it is realized on physical model, which follows same physical laws as real system.

The New Micronet is excellent scientific, research and education facility. List of experiments developed for power-engineering students on Faculty of Electrical Engineering in Banja Luka is too long to be presented in this paper. Experiments cover topics from several courses: Analysis of Power Systems, Electric Machines, Protection of Power Systems etc. Some experiments are suitable for demonstration, but it is also possible to organize some experiments in which students have to measure some values or operate some equipment. It is extremely important to use this laboratory in educational process because it enables students to experience some power engineering phenomena like electromechanical transient regimes and stability issues. It is also possible to demonstrate and train people in manipulations with power systems and its parts.

At the moment, core of the New Micronet is installed and it goes through intensive testing procedures. Process of planning and introducing computer technology has started in parallel with testing. Core of the New Micronet consists of: 3 generators with

models of turbines, 2 rotational transformers to model interconnection, 4 transformers (besides block transformers), around 50 models of power lines and transformer substations, a number of contactors for switching operations and modeling of short circuits, measuring cells and 4 models of active and 5 models of passive consumers. Two out of three generators are made with saliency to model hydro power plants, while last machine is used to model thermal power plant. Machine room with three generators and two rotational transformers are shown in Figure 1 a). Figure 1 b) shows connection panel, which is used to form different experimental schemes. Models of transmission lines and transformer substations as well as measurement cells and contactors are situated behind the connection panel.



a) Models of generators and rotational transformers



b) Connection panels



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Since December 2003



Figure 2. Control Room of the New Micronet

Planned introduction of IT to the New Micronet has to enable easiness of control and conduction of experiments as well as easy data exchange with all interested users. Such equipped laboratory would be competitive with any modern laboratory in the world. Introduction of IT system would improve educational capabilities of the laboratory as well.

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Power System Protection
Conference 2004, 29.
Sept. - 1. oct. 2004, Bled u Slovenia.
More info on:

<http://www.psp-conference.org>,
<http://www.psp-conference.org>.



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Rr Myslym Shyri, Nr 117,1, Tirana, Albania

International Conference - Power Plants 2004

Energy resources, energy efficiency, ecological and operational aspects of power plants.



October/November 2004, Belgrade, Serbia and Montenegro

For BEST: Organizacioni odbor Simpozijuma
P.p. 522, 11 001 Belgrade, Srbia and Montenegro
Tel/fax: + 381 11/ 344 34 98; 245 36 70
Email: simpozijum.termicara@vin.bg.ac.yu

Conferences and Meetings on Power Systems:

29 Mart - 2 April, Fair WIRE, fair on wires and cables, Dusseldorf, Germany,
<http://www.messeduesseldorf.de/wire2004>

4-10 April, Fair ENERGETIKA, Skopje, FYR of Macedonia, www.skopjefair.com.mk,
skfair@mt.met.mk

20-21 April 2004, Modernising Central & European Electricity Markets, Prague, Czech Republic,
s.ducker@highburybiz.com

5-7 May, International Stirling Forum, Osnabruck, Germany, www.ecos-consult.com/et

MAY 2004, 9-12. MELECON, Dubrovnik, Croatia, Power Resources and Systems
<http://www.melecon2004.org>
melecon@melecon2004.org

10-14 May 2004, Technical Fair, Belgrade, Serbia and Montenegro ,info@sajam.co.yu,
www.sajam.co.yu

11-14 May 2004, WIND ENERGY Fair, Hamburg, Germany, <http://www.hamburgmesse.de/windenergy>



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18-21 MAY 2004, ENERGETIKA, Celje, Slovenia, Energy Fair, www.ce-sejem.si info@ce-sejem.si

25-27 May 2004, PowerGen Europe, Barselona Spain, www.pennwell.com

26-28 May. 2004, BPC, Sarajevo, BiH Electricity Market, Deregulation of Power Sector, Power Systems www.balkanpower.org, info@balkanpower.org

25-29 MAY, Electric and Mechanic industry fair, Banja Luka, Bosnia and Herzegovina, blsajam@inecco.net

7-11 June 2004, Electrical engineering Fair, Moscow, Expo center, Russia

6-12 June 2004, PES-General Meeting, Denver, Colorado, USA, Power Systems, Power Engineering 110033.556@compuserve.com

14-17 June 2004, ENERGIA, Energy and Gas Conference, Poznan, Poland, <http://energia.mtp.pl> info@mtp.pl

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23-26 June, ELTEC, Electric Engineering Fair, Munich, Germany, <http://www.eltec-online.de>

28-30 July 2004, Coal - Gen, Overland Park Convention Center, Overland Park, USA www.coal-gen.com, coalgen@pennwell.com

14-19 Sept. 2004, ENERGETIKA, Energy Fair, Zagreb, Croatia <http://www.zv.hr/jesen>

15-17 SEP. 2004, AFRICON, Gaborone, Botswana, Energy and Power Systems, Power Electronics and Drives, <http://eerc.up.ac.za/~ieeee/>

15-17 Sept. 2004, H2EXPO Fair on Hydrogen Fuel Cells, Hamburg, Germany

10-13 OCT. 2004, PES T&D Conference and Exposition, New Orleans, Louisiana, USA, Power Distribution, t.mayne@ieee.org

20-24 Oct. 2004, SASO 2004, Fair on Electric Engineering, Energy and Telecommunications, Split, Croatia www.sajamsplit.hr, sajam@st.htnet.hr

29 - 26 Oct. 2004, Energy and Electronic Fair, Novi Sad, Serbia and Montenegro www.sajam.net, info@nsfair.co.yu

Wind Energy

Wind Changes Influence on Control of Power Systems with High Percentage of Wind Power



FOR BEST:
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This paper illustrates associated problems in terms of control and power balance of the power system with high percentage of wind power generation from the view of transmission system operator (TSO). Paper considers various types of wind farm designs and placement, and explains influence of these designs, in specific way, on managing power balance and control error. Available control reserve rapidity of active power generation is taken into account. Possibilities of managing balance in case of big wind generated deficit are given.

Towards the fashion of renewable energy generation, higher percentage of unpredictable wind generated power becomes challenging issue from the aspect of power system control and power balance. Main drawback on larger installations of wind energy in existing power systems nowadays, and especially for future, is stochastic behavior of wind power generation. Due to unpredictability in wind velocity or lets say unpredictability in energy that wind is characterized with, wind generated power by one windmill or wind farm is unpredictable in same way. So, power systems with high amount of wind generated energy are facing with arising problems in unpredictability in power flow and in maintaining low control error.

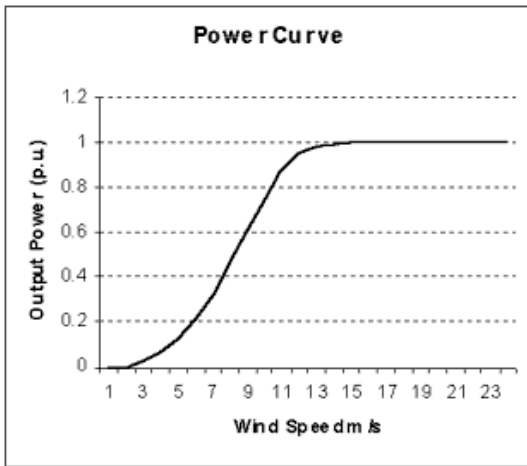
Energy characteristic of the wind turbine with its steepness allows wind turbine to operate in sharp wind-velocity band, only. Wind turbine power curve



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Since December 2003

is shown in Fig. 1. With the variation in wind velocity, there are oscillations in wind power generation, such that are very unpleasant for the power system TSO. Fearing mode is the one when wind velocity exceeds the maximum allowed so the wind turbine got locked (switched off.) In this mode there is no power generation by the wind turbine, and if this is a case for most of the installed wind power then there is an certain need to play in action fast active power reserves. This case, for the system with several wind farms, is equivalent as unpredictable and successive tripping of several thermal units.



Power curve of the wind turbine in p.u. of maximal output power

Control error (P_{CE}) is difference between planned (P_P) and realized exchange (P_R) with surrounding power systems, and it should be zero all the time.

$$P_{CE} = P_P - P_R \quad (1)$$

It is maintained on zero value by rotating control reserve that increases and decreases its generation depending on area control error. When changes in wind speed occur big power output changes happen and they cause area control error and big changes in power flows within the system. In order to set area control error on zero, as fast as possible, rotating control reserve should have ability to change its output power very fast. Because of very strong dependence between wind turbine output and wind speed power systems with high percentage of installed wind power should have control reserve with capability of very high maximal speed of increasing and decreasing of generated power. For power systems with no reservoir hydro power plants this is big problem because thermal, nuclear, and gas fired power plants have much inferior abilities of fast output power changes than hydro power plants.

In all simulations it is presumed that model of the power system, on which analyses are performed, satisfies its load of 1p.u. with its generation of 1p.u. of which 0.1 p.u. is generated by wind power plants. It is also presumed that 0.1 p.u. of installed power in wind turbines is settled in one wind farm and that wind speed changes linearly from 17 m/s to 7 m/s in one minute.

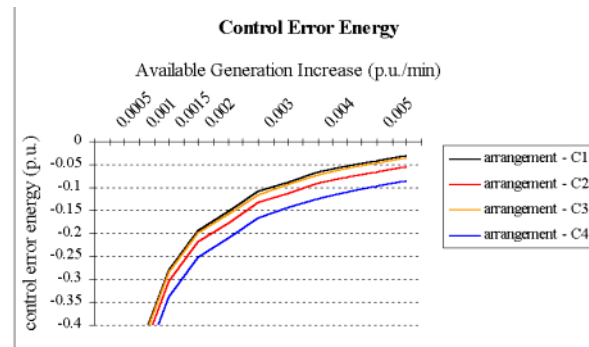
Analyses are performed for different geometrical arrangement of wind turbines in wind farm.

When control error occurs units responsible for control error compensation start to use their control reserve and increase their generation in order to set control error on zero. It is presumed that they are increasing their generation linearly with maximal available speed. Also, it is presumed that power generation changes have inappreciable influence on system frequency.

Complete simulation results can be found at the address:

www.balkanenergy.com/engleski/documents/Wind1E.pdf

Speed of total generation increasing depends on number of units engaged in control reserve. High speed of generation increasing can be achieved with small number of units with big control reserve and capability of fast generation changes or with lots of units with small control reserve and low capabilities of generation changes. Control error energy for different wind turbine arrangements is shown on next picture.



Area control error energy for different arrangements and available speeds of system generation increasing

If available speed of system generation increase is bigger then control error energy is much lower. These curves are very dependent on available speed of generation increase.

Area control error energy is bigger if speed of



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Since December 2003

generation increase is lower and this dependence is nonlinear. Influence of generation increase speed on area control error energy is more significant with small speeds of increasing then with higher. That means that there is no sense to seek for extremely high speed of available generation increase in control error compensation, but also very small speeds must be avoided. Influence of wind turbines arrangement on area control error energy is opposite to speed of generation increasing and it is important at high speed of generation increasing, but at small speed it is less significant.

Conclusions:

Control areas with high percentage of power produced from sources with stochastic output power, like wind farms, have big problems with area control error. Problems are especially big for areas with only thermal and wind production because thermal units are unsuitable for fast changes of generation. In this work it is shown that beside available speed of system generation increase also arrangement of wind turbines in wind farms has extremely big influence on area control error energy. Also high percentage of installed wind power seeks additional amounts of rotating power reserve and control reserve for unwanted deviations power balance. This reserve is part of installed capacities which is not used for production and this part must be much bigger in the case of power systems with high percentage of wind power production.

This paper participated in IEEE PES General Meeting 2003, Toronto, Canada. Full paper can be downloaded on: www.balkanenergy.com/engleski/documents/Wind1E.pdf

Biographies:

Kosta Kosoric was born in Loznica, Yugoslavia on October 18, 1978. He received his B.Sc. in Electrical Engineering from Belgrade University, Belgrade, Yugoslavia in 2002. He is presently postgraduate student at Belgrade University at the Department of Power Systems. He is now engineer in Electricity Coordinating Center in Belgrade which coordinates electric energy exchanges and load-frequency control in South East Europe. His interests are about Operation and Control of Power Systems, Distributed generation, Wind energy and Electricity markets.

Aleksandar Katančević was born in Pirot, Yugoslavia, on August 12, 1977. MSc. Degree in Electrical Engineering was granted with thesis work: "Transient and Dynamic Stability on Wind Farms," by Helsinki University of Technology, in 2003. He gains strong internship-based working experience within power systems companies: ABB Power Systems AB in Ludvika, Sweden, working with HVDC Transmission Systems. ABB Corporate Research Ltd. Utility Solutions in Baden-Dättwil, Switzerland,

focused on electromechanical oscillation issues and computer based system simulations. He is an IEEE, PES, and CS Student Member. Special interests in HVAC and HVDC Transmission Technology, Wind-Energy, Electromechanical Oscillation, partly Electricity Markets.

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KenTec Denmark ApS is a wind energy consultancy company offering support through the whole development phases from finding sites with suitable wind potential and available grid connection over the wind and production assessment and arrangement of contracts with the utility company via Power Purchase Agreement and landowners via Land Lease Agreement. Assistance in financing through Danish and international aid organizations has been performed. Often the outcome is a complete and thorough Feasibility Study with the purpose to reduce risks by highly accurate resource performance and cost analysis

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Conferences and meetings about Wind Energy:

- MAR. 2004, 2-4. CHALMERS University of Technology, Gothenburg, Sweden. Nordic Wind Power Conference – NWPC 2004, Grid Integration and Electrical Systems of Wind Turbines and Wind Farms, contact: <http://www.elkraft.chalmers.se/> , NWPC@elteknik.chalmers.se
- MAR. 2004, 18-19. Lausanne, Switzerland, The Green Power Marketing, contact: info@greenpowermarketing.org, info@recs.org, www.greenpowermarketing.org, www.recs.org
- 11-14 May 2004, Wind Energy 2004, Hamburg Fair Site, Hamburg, Germany, www.windenergy-hamburg.de, gudrun.blickle@hamburg-messe.de



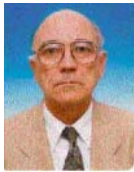
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Since December 2003

Energy Efficiency

In this edition of BEST bulletin we will present to you the first part of Serbian National Energy Efficiency Program organised by **Ministry for science, technology and development**, Government of the Republic Serbia

SERBIAN NATIONAL ENERGY EFFICIENCY PROGRAM – PART 1



For BEST: Prof. dr. Simeon Oka
NPEE Manager,
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a. Foundation

By the decision of the Minister of science, technology and development of Republic Serbia, Dr. Dragan Domazet, in February 2001, National Energy Efficiency Program (NEEP) was organized and started with the activity.

b. Basic data about energy situation in Serbia

Energy resources in Serbia

Major part of all geological primary energy resources in Serbia consists of coal (83%), particularly lignite presents 85%. Geological reserves of oil and gas are only 5,6%, and are mainly exhausted. Hydro potential makes another 4,7%, and oil shale 4,1%. By further investigations those reserves can be augmented by 20%. Large, not yet exploited reserves are present in Kosovo, but presently cannot be used in power production for Serbian industry.

Almost all coal reserves and hydro potential in large water streams are already engaged for the power plants in operation. That means that if the large coal reserves in Kosovo cannot be used, it is not possible in near future to erect new large thermal power plants.

It can be concluded:

- ❖ Serbia is poor in natural energy resources, especially in oil and gas,
- ❖ Coal reserves are the largest, but in great percent already engaged for life time of the plants in operation,
- ❖ The only respectable energy resources in the near future can be:

- Improvement of energy efficiency
- Biomass
- Small local underground mines,
- Hydro potential in small water streams,
- Geothermal energy

That means that the mentioned energy resources can be used only in small and medium size power plants in industry and district heating – i.e. for distributive energy production,

Energy system and related problems

Presently general characteristics of the energy system in Serbia are:

- ⇒ Country is poor in energy resources, and main resource is lignite. In general about 50% of final energy consumption in Serbia is based on imported fuel - oil and gas, in spite of the fact that about 95% of electricity is produced from domestic energy resources - lignite 70% and hydropower 30%. Not looking at the energy consumption in traffic, power production in industry and district heating is mainly based on imported liquid and gaseous fuels. Only about 20% of necessary oil and gas is supplied from domestic resources.
- ⇒ Serbia must account on the large import of energy and fuels,
- ⇒ Technologies in power production and end-use are old, dating from the beginning of 80-ties,
- ⇒ There was no investment in energy sector last 10 years, a number of units are destroyed and refurbishment of the power production equipment is inevitable,
- ⇒ Particularly situation in power production in industry and district heating, and for use in households is much more difficult than in large electric power stations,
- ⇒ Ecological problems in vicinity of power plants and industrial and district heating units are difficult. Environmental control and standards are inadequate for the present environmental policy in Europe,
- ⇒ Energy inefficiency in electric power production, industrial and district heating units, in electricity transfer and distribution, and in final consumption is large and evident at every step,
- ⇒ Ratios between prices of different types of energy and different fuels are inadequate and do not cover production costs. Due to this, electric energy is unreasonable used for heating houses and flats.

Some data about energy efficiency



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The following data can illustrate present status in energy sector, particularly in energy efficiency:

- ❖ GDP has been decrease from 1989 for 2.5 times,
- ❖ Electricity consumption per capita 3400 kWh/capita per year, at the level of middle developed countries in Europe,
- ❖ Electricity consumption per 1000\$ of GDP - 1700kWh/000\$, per year, the highest in Europe,
- ❖ Overall energy consumption per 1000\$ of GDP - 1100 ten/000\$, per year, the highest in Europe, but
- ❖ Overall energy consumption 1500 ten/capita per year the lowest in Europe.
- ❖ The highest transmission and distribution losses in Europe – 19%.
- ❖ Electricity prices about 2c\$/kWh, several times lower than in Europe,
- ❖ Electricity consumption in households rises from 35% to 55% of the power production, and in industry diminished from 37% to 31%.

c. The main objectives of the Energy Strategy in Serbia

In Strategy of the Development of Energy Sector in Serbia up to the 2010, formulated in the frame of the Strategy of Industrial Development in Serbia up to the 2010, initiated by the Ministry of Science, technology and development, following the decision of the Government of Republic Serbia, among others, the following main objectives are pointed out:

- ⇒ Implementation of National energy efficiency program - taking care about efficiency in the use of resources, power production, transport and distribution and end-use of energy, with the aim to improve energy efficiency by 20% up to the 2010.
- ⇒ Implementation of distributive energy production, based on local fuels and renewable energy resources,
- ⇒ Maximal, economically proven, and ecologically acceptable use of local domestic fuels and energy resources,
- ⇒ Maximal, economically proven use of renewable energy resources - biomass, small hydro potential, geothermal energy and solar energy, augmentation of the share of the renewable and alternative energy resources in power production from 1% today up to 4-5% up to the 2010.
- ⇒ Implementation of modern clean and efficient technologies in the course of refurbishment of power system,
- ⇒ More strict environmental protection.

d. Motives for foundation of the NPEE

- ❖ Energy **INEFFICIENCY** in all sub sectors of the energy sector in Serbia is large and evident at every step,
- ❖ Since Serbia is poor in natural resources rational use of natural resources and natural potential of the environment is one of the most important issues.
- ❖ The only respectable natural energy resources in the near future can be:
 - * Small local underground mines,
 - * Biomass
 - * Hydro potential in small water streams,
 - * Geothermal energy
- ❖ One of the largest remained energy resources is rational and efficient use of energy.

e. Basic principles of the NPEE

The following principles were put in the basis of the strategy of the national energy efficiency program:

- Energy efficiency has to be improved in all sub sectors of the energy sector, along the whole chain from heat and electric energy production till end use in industry, municipal systems and households,
- The notion “energy efficiency” covers: the rational and efficient use of natural resources, substitution of the imported fuels by domestic energy resources and use of renewable and alternative energy resources, as well as the conventional notion – energy efficiency in power and heat production and end use of energy.
- Environmental protection is inevitable condition for all activities under the National energy efficiency program.
- NPEE has to unite activities of scientific institutions, universities and industry in the same direction and with the same aim: to improve energy efficiency in the whole chain from power production till end use.
- NPEE has to demonstrate, promote and implement modern technologies, equipment and methods for efficient use of energy resources, with higher efficiency of fuel transformation and final energy consumption and transformation,
- NPEE has to start and promote R&D of the modern, high efficient and environmentally acceptable technologies, equipment and methods in power and heat production and end use of energy in industry and to start production of efficient energy equipment.
- All activities of the NPEE have to be supported by regulations, standards and laws making environment and condition for rational behavior of the industrial entities, families and individuals.



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CV:

Dr. Simeon Oka was born on 3.10.1935. in Belgrade. Educated at Mechanical Engineering in Belgrade he obtained his B.Sc. in 1960. and Ph.D. in 1971. in fluid mechanics. Engaged in Institute for Nuclear Sciences VIN^A, in Laboratory for Thermal Engineering and Energy from 1960. he was appointed in 1986 for scientific councilor. Full professor at Mechanical engineering faculty he became in 1986. too. He is a member of editorial board in **Russian Journal of Engineering Thermophysics** and **Journal of Aerothermomechanics** and is editor of the journal **Thermal Science**. In 1995. he was elected for a honorary member of the Scientific Council of the institute for thermophysics of the Russian Academy of Sciences in Novosibirsk. Dr. Simeon Oka was elected in 1996. in Serbian Scientific Society.

During 43 years long research activity he was engaged in fundamental and applied research of physical processes essential in energetic, in the field of fluid mechanics (turbulence), heat transfer and combustion, followed by implementation of the scientific achievements for development of modern energy technologies. By his initiative research activity started in the Institute in the fields: turbulent flows with recirculated regions, flow and heat transfer in two-phase gas-particle systems, hightemperature turbulent flows with chemical reactions, fluidized bed combustion. Dr. Simeon Oka was awarded in 1986. and in 1994 by October Award of the city Belgrade for scientific results in investigations and development of fluidized bed technology. He published more than 50 papers in international and Yugoslav journals and more than 100 papers in proceedings of the international and Yugoslav conferences. Dr. Simeon Oka has written 2 monographs, 2 university text books and 2 books of monograph character, end edited 3 international books of invited papers and 2 Yugoslav books of invited papers in the field of turbulent flows at high temperatures and fluidized bed combustion. He is also author of 3 patents in the filed of fluidized bed combustion.

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Solar energy

THE SOLAR PRIZE GIVING CEREMONY

The „Solar Award 2003” prize giving ceremony has been taken at SOPRON, at the headquarters of the award founder EUROSOLAR HUNGARY, in the Ceremony Hall of Lord Mayor’s house, on the 12th of December 2003.

EUROSOLAR HUNGARY, the Hungarian centre of the well known European EUROSOLAR organisation, as well as the founder of this prize, maintains a significant activity in Hungary since a couple of years.

Under the leadership of president Dr. Judit Rónai they took up the hard and important everyday work, a mission of promoting the renewables, shaping and forming the environmental consciousness in Hungary. It is welcome news that their initiative the „Solar Prize”, that has been started several years

ago, has quickly become successful for today and is treated and accepted as a tradition by now.

A very particular feature of the present prize giving ceremony – and this can be considered as accomplishing of inwardness of the prize- that beyond awarding the strictly solar related activities many other persons and companies were prized now, who could show up significant results on other renewable fields or could show up merits in education or publications in media as well. This prize therefore is a very precious acknowledgement based on the judgment of a jury consisting of expert personalities.

GAIASOLAR proudly presents to all partners that based upon our past activity has won this important expert prize in the category of the most efficient solar PV system installer and integrator company. During the year 2003, GAIASOLAR has built the majority of the most significant solar and renewable installations in Hungary in the private sector. The Award Winner works were two family houses – with turn-key installation: one house with a 2.6 kWp Grid – Interactive application, and the other was a 2.6 kWp solar PV, OFF grid, rural application (5 days of full powered autonomy). A special feature of this installation was that the construction works of the house were powered also by a temporary installed solar PV system because on the region no GRID electricity is present. The system elements later were integrated to the house.



Grid Interactive solar house,
2.6 kWp Installed power



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Since December 2003



OFF grid family house,
2.6 kWp installed power

Awards were given to prize winners by **Mr. Istvan Öri**, state secretary of the Ministry of Environment and Water affairs, **Mr. Dezsö Walter**, the Lord Mayor of Sopron and the attendant representatives of EUROSOLAR and EUROSOLAR HUNGARY.



Solare PV Prize

Gaiasolar - Company Profile



www.gaiasolar.com

GAIASOLAR SYSTEM HOUSE is a dynamic developing private company, founded in Hungary. Main activity is system design, contracting projects in renewable energy, turn-key installation, engineering consultancy. Marketing and export import trade of renewable energy system and system components, are also included into our service offer. Our mission is to contribute to enhance the World Green Energy potential – with solar/wind/solar-thermo/geothermal energies – by completing practical applications. The founders and owners have excellent track record on renewable fields going back to nearly 10 years.

The worker team is also carefully selected, and is consisting of well-trained members who have gained considerable experience on renewable energy in everyday practice. Gaiasolar is a market leader in

Hungary --- showing up significant projects in Hungary and in countries neighboring Hungary, too. A precious acknowledgement of this activity that we have been awarded with the honoring prize “Solar prize 2003” by EUROSOLAR Hungary, in the category of the most effective solar system integrator.

GAIASOLAR maintains and develops business activity in neighboring countries around Hungary, in the Central-Mid European area, and in former CIS countries. The region south to Hungary is one of our highlighted target area but we are present on other parts of Europe and Africa, too.

One of our special strength is the high level installation work. Our workers - possessing the special alpine mountain climbing technique - are able to successfully complete installations even on hardly viable areas – such as cliffs, rocks, hilly area – or facing with other highly unusual or extreme field conditions.

SERVICES

- Contracting for Projects in Renewable Energy field
- System design (Solar PV, Solar thermo collectors, geothermal-heat pump)
- Systems design of Hybrid renewable systems (solar PV/Wind, solar PV/ Geothermal, PV/Thermo/Heat pump, etc.,) Turn key installations
- Maintenance and service

ZERO ENERGY HOUSES (ZEH)

- A special offer of our company to our partners to realize their hidden wish for a dream house that requires minimum or no energy for operation. This house will consume considerably less energy (or no energy) – during a whole year – than other conventional houses. With careful design it can be achieved that in winter season the house will require only minimum energy level, in summer season the operation will be zero or plus energy will be obtained. The energy excess will be feed back to grid.
- Architect design (construction, passive and active solar design, green roofs)
- Energetic design
- Turn – key installation

TRADEING EXPORT-IMPORT



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Since December 2003

- Solar PV modules, Solar Thermo collectors
- Inverters, Battery chargers, Batteries
- Geothermal- heat pumping systems
- Wind energy systems
- Solar Lamps (standalone street lamps, garden lamps, outdoor/indoor)
- Solar powered water Pumping - systems
- Mounting accessories (fixtures, etc.,)

FOR BEST: **Zoltan Melicher**, zoltan@gaiasolar.com
General manager

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Solaris Solaris has supplied and installed over 80 thermal solar systems, covering over 550 m² all over Ireland since 1997. We currently represent four German manufacturers of selectively-coated flat-plate collectors with several installation options; the most popular being roof-integrated, roof-mounted (especially for retro-fit installation), wall-mounted (where orientation dictates) or free-standing. Solaris is working with a number of international companies across Europe, Asia and the US & Canada.

For BEST: Fritz Raake
Tel: +353-(0)26-46312 , Ireland
www.solaris-energy.com , solaris@eircom.net.



TITANSOL - Manufacturer of solar thermal systems and components. Solar thermal panels, Solar electronic control panels, solar water heaters, Installation of large scale solar systems.

For BEST: Oikonomidis Christoforos
www.titansol.gr , oikon@hol.gr
Tel. +30 210 9969351 Fax/tel. +30 210 93519925,
Agias Aikaterinis str, 173 42 Agios Dimitrios, Athens, Greece

Ecology

Energy of microorganisms



For BEST: Mihajlovic Ivan
Technical Faculty of Bor, Vojske Jugoslavije 12, 19210 Bor,
imihajlovic@tf.bor.ac.yu

Because of continuous depletion of rich ore deposits, trend of mining deeper under ground, growing dissatisfaction of humanity because of ecological problems related to pirometallurgical treatment of sulphide minerals and combustion of fossil fuels as well as rise of prices of energy needed in traditional methods of mining and metal processing there is need for revitalization of bacterial leaching methods and microbial treating of waste waters contaminated with heavy metals.

Progress in genetic manipulations of microorganisms for industrial purposes is correlated with needs for contrivance alternative for conventional methods of mining, ore treatment and treatment of waste waters.

Practically all sulphide lodes contains mineral pyrite (FeS₂), while most mine waters contain active bacterium named *Thiobacillus ferrooxidans*, which provide energy for its survival by acceleration of (Fe²⁺)⁺ion oxidation to (Fe³⁺)⁺ion. Same fact that this bacterium provides energy on mentioned way would not mean much if (Fe³⁺) isn't very good chemical oxidation agents.

By discovering of named facts many mining companies decided to apply *T. ferrooxidans* for metal extraction. Newmont Gold of Denver, company from Colorado, uses this bacterium for derivation of gold. This company patented process of bioleaching, similar to heap leaching. This procedure doesn't lead to direct leaching of gold but leads to pyrite dissolution and exposure of gold for subsequent process of cyanidation. Because of this hemolitotropic nature *T. ferrooxidans* is called rock eating bacterium.

Nearly eleven percent of copper produced in USA is gained from poor ores by their microbial leaching with *T. ferrooxidans*. In Bingham Canyon copper mine, near Salt Lake City (Utah), copper ore is too poor to be used for pirometallurgical extraction of metal. Because of that it is treated by bacterial leaching method. Bacteria forms film on mineral



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Since December 2003

surface and it is enough to leach heap of ore by water and thus way produce leaching solutions reach on copper to win metal by extraction with organic solvent and electrolysis.

Besides mentioned appliances *T. ferrooxidans* is also used for uranium extraction. Bacterium doesn't effects uranium mineral directly, but is generating (Fe^{3+}) ions from pyrite, which effect on minerals containing (U^{4+}) and accelerate oxidation to (U^{6+}), which is soluble in diluted sulfuric acid.

All mentioned points that use of microorganisms in future is going to be technology of choice for mining, metallurgy and waste water treatment.

Green Schools - bringing energy and environmental education to schools

For BEST: Alliance to Save Energy, Francuska 5 / IV Floor,
11000 Belgrade, Serbia & Montenegro
Tel: +381-11-181-569, Fax: +381-11-626-217, E-mail: office@ase.org.yu, Web: www.ase.org.yu

The Green Schools Program of the Alliance to Save Energy is a long term educational initiative that focuses on the environmental protection through the rational use of energy. The program is aimed at 1st and 4th grade students of primary schools, their teachers, parents and communities and has a multicultural and bilingual approach (currently, the program is administered in both the Serbian and Albanian languages).

Green Schools was developed in cooperation with the Serbian Ministry of Education and Sport, Ministry of Natural Resources and Environmental Protection and Ministry of Mining and Energy. It is based on the experience of a pilot project in 100 Serbian schools during the Alliance-sponsored Energy Efficiency Week in December 2001 that targeted 100,000 students.

Green Schools help schools to decrease their energy budget, increase environmental consciousness, develop projects and participate in domestic and international competitions. During the 2002/2003 school year, Green Schools from Razanj and Babusnica won the top positions in the prestigious international Earth Apple Awards and valuable computer equipment (donated by the ABB).

Teachers benefit from the professional development and participation in the officially approved program based on the active teaching concept. During

2002/2003 Green schools educated 140 teachers in South and East Serbia while an additional 190 teachers were trained for the 2003/2004 school year. Green Schools also trained 12 teachers in Kraljevo (cooperation with French humanitarian organization Premiere Urgence) and about 50 teachers in other schools on the territory of Serbia.

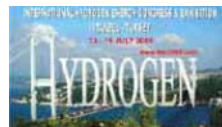
Green Schools pilot project in Montenegro received a full attention of the Montenegrin Ministry of Education and attracted the additional 25 schools in Kolasin, Mojkovac and Bijelo Polje. The Alliance trained 76 teachers and involved 2,500 students in the activities designed for the second semester of the school year 2003/2004.

Students enjoy Green Schools and the curriculum once a week, adopting behavioral changes and influencing their families and community. They express their creativity through theatre performances and art competitions. During the Green Schools Poster Competition, students from 12 of the 90 Serbia Green Schools won valuable prizes in the insulation material and technical equipment (donated by Philips, Ursa, Treleborg) for their schools and an excursion to Belgrade.

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Conferences and Meetings on Ecology:

HYDROGEN - FIRST ANNOUNCEMENT & CALL FOR PAPERS - INTERNATIONAL HYDROGEN ENERGY CONGRESS & EXHIBITION, "RECENT ADVANCES IN HYDROGEN ENERGY TECHNOLOGIES", 13-15 JULY 2005, ISTANBUL-TURKEY (www.ihec2005.com)



Istanbul is preparing to become an important international center for hydrogen energy. An agreement was reached and finalized on the 21st October 2003 between the Turkish Government and UNIDO to establish the International Center for Hydrogen Energy Technology (ICHET) in Istanbul. This meeting aims not only to celebrate the event but also to recognize the contributions of Prof. Veziroglu, by bringing together academic and industrial organizations related to the Hydrogen Energy Sector, facilitating communication and promoting the use of hydrogen as a fuel. The



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Conference will address scientific and technical issues related to hydrogen energy together with economic and national policies.

CONGRESS TOPICS


- Hydrogen Production Technologies
- Hydrogen Storage and Transportation
- Hydrogen Utilization
- Hydrogen Energy Systems
- Hydrogen Safety
- Hydrogen Energy Economy
- Fuel Cells
- National/International Perspectives
- Environmental Issues
- Financing
- Social Acceptance
- International Implications

October 31st 2004 One page abstract due
 March 1st 2005 Camera-ready manuscript due
 April 1st 2005 Deadline for advanced registration
<http://www.ihec2005.com>, secretariat@ihec2005.com

Or contact

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 Tel: +90 212 584 16 00 Fax: +90 212 266 10 76 E-mail:
engtr@superonline.com

For BEST: Prof. Dr. I. Engin Ture



May 2004
**FIRST INTERNATIONAL
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"ELECTRA III"

Third International Conference on Environment Management (Energy Efficiency in Power Engineering)

Certified by Ministry of Natural Riches and Environment Protection, Ministry Science, Technology and Development, Ministry of Mining and Energy of Serbia and Montenegro.

June 2004. in Herceg Novi, International Conference "ELECTRA III", Organized by Power Utilities of Serbia, Republic of Srpska and Montenegro.

Important dates:

27. February, abstracts submission

15. April, acceptance verification

1. May, papers submission

Information: FORUM KVALITETA, 11030 Beograd, Kraljice Katarine 44

t/f: 011 555 791, mob: 063 8757 934,

e-mail: forumq@eunet.yu

For BEST: F. Coha, president

Electricity Markets

/BEST will try, with Your help, to present international experiences with deregulation of power sector in sense of electricity market liberalization and in sense of changes from the aspect of the ownership. BEST invites You to present short materials by the topic of deregulation related next countries: American continent, EU countries, Australian continent, Japan and others. BEST hope to get Your feedback, therefore thank in advance for Your work and remind that cooperation is based on voluntary work (BEST do not provide financial refund for Your work). /

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TELMARK

TELMARK, www.telmark.org - Technology impacts on load profiling for tariff development and deregulated European Electricity MARKets, is initiative led by Kingston University in the UK. TELMARK initiative represents consortium of:

- Kingston University (www.kingston.ac.uk) - UK,
- ELECTRICA SA (www.electrica.ro) - Romania
- SEEBOARD plc (www.seeboard.com) - UK,
- Schneider Electric Ltd (www.schneiderpm.com) - UK,

This consortium has been organizing in past several public forums where interesting topics related evolution of European power market was covered. Research agenda covered by TELMARK is shown below:

- Technology evolution and future European electricity markets



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- Interaction of load data with financial transactions and electricity market trading
- Load profiles - new applications
- Electricity tariff innovation
- Neural networks, data mining and forecasting
- Storage and distributed generation
- Metering - future trends & technologies
- Technology impacts, market competition & services
- Regulation, mechanisms and market design
- Capacity and security pricing
- Load data ownership and value-added services

Cost per delegate
(standard rate)

£500.00/€750 plus VAT – 1 day

£700.00/€1050 plus VAT – 2 day

informations: m.skelton@highburybiz.com

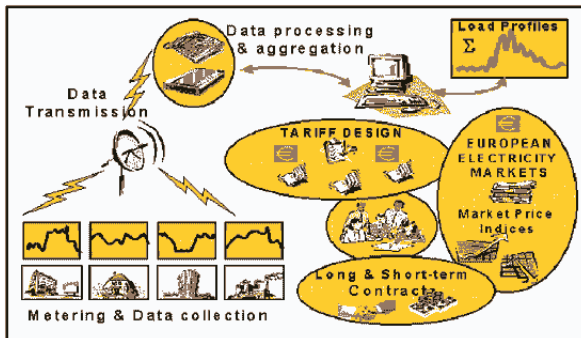
s.ducker@highburybiz.com

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BEST recommends to those interested in description of TELMARK work, objectives, mission and vision to visit www.telmark.org and find more there. At www.telmark.org can be found also many and very interesting presentations and worth technical materials from the previous forums and meetings. /BEST/.



- 26-28 May 2004, Balkan Power Conference, Sarajevo, BiH, Electricity Market, Deregulation of Power Sector, Power Systems, www.balkanpower.org info@balkanpower.org

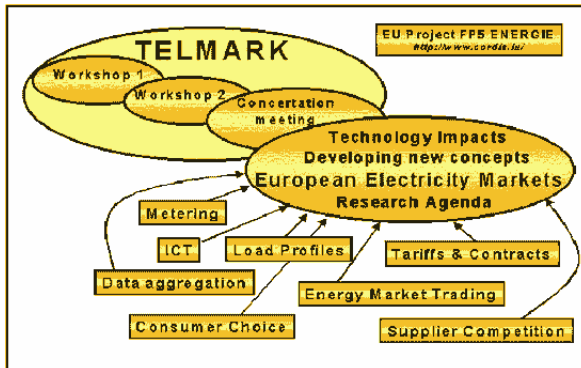


Hydro energy

Meeting Report - International Conference on Case Studies in Hydraulic Systems – CSHS '03

September 29 – October 1, 2003, Belgrade, Serbia

For BEST: **Prof. dr Aleksandar Gajic** President of the CSHS '03 Organizing Committee, Faculty of Mechanical Engineering, University of Belgrade, Serbia and Montenegro



The CSHS '03 Conference was organized by the Hydraulic Machinery and Energy Systems Department of the Faculty of Mechanical Engineering at the University of Belgrade, and in cooperation with the International Association for Hydraulic Research and the Energoprojekt Co. - Belgrade. The Conference was dedicated to the 80-th birthday anniversary of Dr. Ljubisav Krsmanovic, professor emeritus at the Faculty of Mechanical engineering of the University of Belgrade, the outstanding professor, scientist and engineer in the Serbian Hydraulic Community. The Conference was attended by 111 participants from universities, research institutes and industry, arriving from 14 countries, including Argentina, Canada, England, Germany, Holland, Iran, Japan, FYR Macedonia, Portugal, Romania, Russia, Serbia and Montenegro, Slovenia and USA. The Conference was hosted by "Energoprojekt" Co.

Conferences and meetings on Electricity Market:

- Modernising Central European Electricity Markets Conference 2004, 20th - 21st April. Radisson SAS Hotel, Stepanska 40, Prague, 11000, Czech Republic



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The opening ceremony at the CSHS '03 dedicated to the Prof. Krsmanovic 80-th birthday anniversary (the first from the left).

In two days 28 papers are presented in technical sessions, covering the case studies in design, construction and exploitation of hydropower plants, water supply systems and hydraulic installations. The papers on interdisciplinary hydraulic problems, occurring in medicine and thermal-hydraulics, were also included. The following topics were addressed:

- *Accidents and incidents in hydraulic systems failures and troubleshooting*
- *Analysis of pumps, turbines and pump-turbines*
- *Behavior of hydraulic machinery, equipment and conduits*
- *Cavitation in hydraulic systems and cavitation erosion problems*
- *Environmental considerations in design and operation of hydraulic systems*
- *Fluid-structure interaction*
- *Hydraulic transients and control systems*
- *Hydraulic oscillations and flow-induced vibrations*
- *Monitoring, diagnostics and predictive maintenance*

- *Optimization of hydropower, water supply and navigation systems.*

The contributed papers, case studies of contemporary hydraulic problems and up-to-date projects, shared knowledge and fruitful discussions make the CSHS '03 a remarkable event in the international hydraulics community.

The second day of the Conference, the participants visited the Belgrade Waterworks, while the third day the post conference tour was organized to the 2100 MW Hydro Power Plant "Djerdap I", located 250 km from Belgrade, in the picturesque nature of the river Danube. The place is also known by the Roman Emperors Traian table (101 AD) and Diocletian (294 AD) - the stone inscription with the information about the Roman bridge that had connected Balkan with Dacia in old times. As a part of the Social Program, the conference banquet was organized.



Visit to Hydro Plant Djerdap I

The Conference Proceedings in the form of 240 pages book and on the CD-ROM can be ordered from the Organizer (Prof. A. Gajic, mailing address: University of Belgrade, 27. marta 80, 11 000 Belgrade, Serbia and Montenegro, or e-mail: agajic@mas.bg.ac.yu).

Conference web site: <http://cshs03.mas.bg.ac.yu>

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/BEST is collecting data about hydro potentials for whole Balkan region and when done will be published at the balkanenergy.com webpage and in the some of next bulletin issues. Therefore please be free to share with us this information if You think that their public announcement will help better utilisation of these resources./



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Since December 2003

Email: office@balkanenergy.com
Web: www.balkanenergy.com

“MEP – ENGINEERING”, Bajina Bašta

Design and produce small hydro power plants

Main business for which we are registered for:

1. Electric energy production from Hydro Power and other energy sources
2. Turbine production for small hydro power plants
3. Production of measuring and control equipment

Advantages of “MEP – ENGINEERING”:

- Great experience in design, production and building of power installations
- Familiar with market for small hydro power plants and other power equipment
- Willingness to invest

For BEST: Dusko Neskovic, director, inkombb@ptt.yu

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