



KOZLODUY NPP REVIEW

The English language bulletin of Kozloduy Nuclear Power Plant

❖ No.4 July-August, 2006

Kozloduy NPP on the deregulated market in 2006



In the first half of 2006 Kozloduy NPP confirmed its role of a strong player on the deregulated energy market in Bulgaria. A quota of 850,158 MWh was set for Kozloduy NPP by the State Energy and Water Regulatory Commission. To fulfill the electric power quota, in addition to contracts with privileged customers, in 2005 Kozloduy NPP signed four new contracts.

By attracting more prestigious and economically stable companies Kozloduy NPP achieves several goals: diversification of customers, ensuring stable flow of money to the company, and establishing KNPP's image as a reliable electricity supplier. A 100 percent fulfillment of the free market quota was possible through selection of customers with appropriate power needs and through providing flexible balance of supplies. Kozloduy NPP is the only power producer in Bulgaria who utilizes to the fullest extent

its market quotas. Electric power sales on the deregulated market made up for 8.75 percent of the net export of the company in the first half of 2006. The average net hourly load for this period was 196 MW. Financial results of free market sales demonstrate the advantages of freely negotiated prices in terms of profitability.

The overall free quota on the notational market amounts to 2,233,614 MWh, and only 1,431,033 were actually utilized by various producers. Thus, the market share of Kozloduy NPP on the deregulated market comes to 59.41 percent. On a weekly basis, the share of Kozloduy NPP sometimes reaches 70 percent.

It is envisaged that the free market will expand in the second half of 2006, pursuant to relevant regulation, and the State Energy and Water Regulatory Commission set a higher quota of 2,323,161 MWh or 13-14 percent of the estimated annual generation. Kozloduy NPP signed new contracts with customers so as to utilize the bigger free market quota.

INSIDE

UK delegation at KNPP

see p. 3

Summer internships

see p. 6

Accents



Experts from India come to KNPP

On August 29, 2006 a group of Indian scientists from the Bhabha Atomic Research Center, Mumbai, visited KNPP. The visit was organized by the Embassy of India and Kozloduy NPP. The Indian scientists were accompanied by their colleagues from the Bulgarian Institute for Nuclear Research and Nuclear Energy.

Mr Ivan Genov, KNPP Executive Director, met with the guests and familiarized them with the operation of Kozloduy NPP. They were particularly interested in the VVER-1000 reactors as India is going to commission such a reactor in near future.

The guests visited the control rooms of Unit 2, 3 and 6 and the Full-Scope Simulator for units VVER-1000. Afterwards, the experts from the Bhabha Atomic Research Center shared their excellent impressions as regards housekeeping and professionalism of KNPP personnel.



Chinese diplomat visits Kozloduy NPP

Mr Shi Yunxiao, First Secretary, Science and Technology Section at the Embassy of the People's Republic of China visited Kozloduy NPP on August 18, 2006. He was accompanied by his wife. The visit was initiated by the Chinese Embassy in Bulgaria. Mr Shi Yunxiao met with the top management of Kozloduy NPP. Kiril Nikolov, Production Director at KNPP, and Mitko Yankov, Safety and Quality Director, familiarized the guests with key aspects of KNPP operation. Mr Shi Yunxiao noted that this was the first visit of a Chinese diplomat to the nuclear plant and demonstrated a serious interest to the KNPP operation.

Mr Shi Yunxiao said the purpose of his visit was to establish contacts and cooperation between Bulgarian and Chinese specialists in nuclear energy. This intention of his was backed up by the fact that Bulgaria has a strong tradition in nuclear industry and over 30 years of operation of Kozloduy NPP.

After the meeting with KNPP managers, Mr Shi Yunxiao visited Units 2,3 and 6.

Partnership



UK delegation comes to share experience with Kozloduy NPP

A delegation from Copeland County, West Cumbria, visited Kozloduy NPP on July 18, 2006. The group included Zena Bergmann, Copeland BC; Frank Duffy, nuclear policy officer from Copeland BC, and Mike Tichford, Manager Recreation, Copeland BC. They were also accompanied by John Sidney, British Nuclear Group, Graham Watson, Cumbria Tourist Board, and Corinne Watson from the Cumbria County Council.

The British guests were accompanied by Milko Torbov, Mayor of Kozloduy Municipality. The visitors met with Ivan Genov, KNPP Executive Director, and other managers from the nuclear plant. Ivan Genov pointed out that the British experience in decommissioning will help our company in dealing with social consequences of the forthcoming decommissioning. A presentation was made to familiarize the guests with the human resources policies of Kozloduy NPP. A special accent was put on successful projects implemented together with the Kozloduy Regional Economic Development Initiative (KREDI), a NGO working in various spheres in the region of

Kozloduy.

The guests from Great Britain visited Units 2, 3 and 6. KNPP specialists answered numerous questions regarding safe operation of facilities.

Kozloduy NPP specialists at international conference



Six KNPP specialists from the Kozloduy chapter of the Bulgarian Physics Society participated in the 6th International Conference of the Balkan Physical Union. The event took place in Istanbul, Turkey, from August 22 to 26, 2006.

Scientists and practitioners from various countries presented about a hundred papers in the course of the conference. The presentations and the poster sessions were divided into 19 different areas of physics covering a broad range of topics. The KNPP specialists had the chance to exchange ideas and opinions with their colleagues from the Balkan countries. Our employees said they particularly valued the opportunity of establishing personal contacts with leading scientists.

Prof. Ivan Lalov from the University of Sofia helped KNPP physicists to meet physics societies' members from Turkey, Rumania, Albania, Greece, and Serbia. Our specialists said they were especially glad to meet Prof. Martial Ducloy, a former secretary general of the European Physics Society by whose initiative Year 2005 was declared a World Year of Physics.

Accents

Reactor core physics specialists guarantee successful campaigns

Losses from early closure of reactors reduced by EUR 26 million



Safe transportation of low-burnt fuel assemblies

Transportation of low-burnt fuel from Units 1 and 2 to Units 3 and 4 was not a standard and easy task. It was crucial to have precise calculations and analyses from the reactor core physics (RCP) specialists for VVER-440. Specialized soft-

Starting at the end of 2002, after Units 1 and 2 were shut down, the fuel from these units was taken and used in four consecutive fuel cycles at Units 3 and 4. From Unit 1 were taken 183 low-burnt fuel assemblies and from Unit 2 were utilized 228 assemblies. The overall effect from their remaining resources equals to more than 200 fresh fuel assemblies. This minimized financial expenditures as regards buying fuel assemblies for VVER-440. Thus, losses from early closure of reactors were reduced by EUR 26 million.

Utilization of low-burnt fuel assemblies had yet another positive effect: the amount of spent fuel coming from Units 3 and 4 was reduced as well. This means that economic effect should be estimated at approximately EUR 40 million.

ware was used for this purpose: ORIGEN 2 and SCALE-4.4a. The major challenge for the physicists was to prove safety of a special type of container used for transportation of irradiated fuel. This container is designed for transportation of spent fuel assemblies of VVER-440 at the plant site provided that these assemblies were deposited in a spent fuel pond no less than three years.

A few months before closure of Units 1 and 2, the RCP specialists started analyzing container's safety from a physical point of view. Calculations were made for radiation characteristics of irradiated fuel assemblies from Units 1 and 2, and specific physical analyses were done so as to prove that it was possible to safely transport assemblies

Continued on page 5

☞ From page 4

after four months in the ponds. The number of assemblies per container was reduced from thirty to six. The Reactor Core Physics Department for VEER-440 presented to the Nuclear Regulatory Agency the possibility of transportation. Furthermore, the specialists from Reactor Technologies and the RCP specialists examined the container before the first transport. Thus, physical calculations were confirmed.

Thanks to the experience and professionalism of specialists Kozloduy NPP successfully implemented a unique program as regards transportation of irradiated fuel.

Specificity of reactor core physics

All the activities of the Reactor Core Physics Department are regulated by the Safe Use of Nuclear Energy Act as well as by regulations of the Nuclear Regulatory Agency (NRA).

Planning of each fuel cycle for a unit begins at least two years in advance.

The first task is to do the theoretical basis and calculate the necessary number of fresh fuel assemblies, as well as to determine the exact place of each assembly in the core.

Before refueling begins, the KNPP specialists prove to the Nuclear Regulatory Agency through neutron physical calculations that the core is safely designed. Upon refueling, through hot zero power physics tests, specialists prove that the core is safely loaded and there is a complete correspondence between designed and real project,



i.e. all the initial criteria are successfully met. These are necessary conditions for obtaining a NRA permit for power increase and operation.

Following international standards, the specialists execute start-up physics tests at the beginning of each cycle. During these experiments, measured values are compared with preliminary calculations. Reactor power can only be increased after certain criteria are met.

The physicists have their duties even upon reactor's start-up. During the fuel cycle they keep off-line models of the core with reached burn-up of the fuel assemblies. The neutron physical characteristics of the core are known at each moment during the cycle so they can be used for prediction of transient processes when changing the power level.

Kozloduy NPP has well qualified specialists and state-of-the-art software which guarantees safety through the whole fuel cycle, including storage in the future Dry Spent Fuel Storage Facility.

Experience

Kozloduy NPP ensures integration between industry and educational system

Each year Kozloduy NPP opens its doors for summer internship programs for students in relevant disciplines. These programs, popularly called "trainings," are a mandatory part of the university curricula. The internships are coordinated by the KNPP's Training Center. Thus, Kozloduy NPP has a special role in ensuring integration between industry and educational institutions. The internships are also a part of the company policy of maintaining close relationship with universities as a source of prospective employees. In recent years, recruitment of young specialists has become an important issue due to several factors: opening of the labor market to foreign countries, popularity of certain new professions, mainly in the IT business, lower number of students in engineering, etc.

The internships program has been permanently improved, said Mr Lubomir Pironkov, Chief of Personnel and Training Center. The organization of these internships starts as soon as contracts are signed

with candidates. Specific programs are prepared for various majors under the guidance of Training Center experts.

A positive sign of appreciation is the larger number of universities interested in cooperation with Kozloduy NPP. Since January 2006 till now, 115 students were trained from the Technical University of Sofia, United Technical College, Sofia University St. Kliment Ohridski, etc. A two-week training was organized for students from Igor Kurchatov Vocational School of Nuclear Energy. At the request of Bulatom, Kozloduy NPP provided additional training for 39 physics teachers and students from various schools. The company has organized individual training for 15 students coming from several national universities.

It is not rare that international institutions are interested in Kozloduy NPP too. Students were accepted from St. St. Cyril and Methodius University (Skopje), the Warsaw Polytechnic, a French vocational school, etc.

Summer internships attract talented students

Twenty-two students got the opportunity to have their internships at Kozloduy NPP this year.

Kozloduy NPP organized the internship program as a part of its social responsibility policy with a long-term commitment to create and maintain favorable business environment for young Bulgarian special-

ists. The company has set as a high priority the possibility to recruit qualified people from various universities according to the company needs. The major goals set by the management are:

- To get interns who want to develop their professional skills and gain experience and hands-on training in real busi-

Continued on page 7



Tihomir Petrov
Sofia
University
St. Kliment
Ohridski

When I saw the nuclear plant for the first time I was so impressed by its great size and by the work organization on the site. I was also impressed by the modern automation and control systems. I chose Kozloduy NPP for my summer internship so as to enrich my knowledge about nuclear units' operation. This is probably the only place where my skills and knowledge are truly applicable. My career plans are only related to Kozloduy NPP.



Dessislava Todorova
Sofia
University
St. Kliment
Ohridski

I decided to apply for an internship at KNPP because I was sure it would be interesting and beneficial to see so many things which could only be seen here. My project was "Biological impact of radiation." I have never doubted the safety of our nuclear plant but my work on the project gave me the opportunity to see how strictly controlled are all these parameters. I am really impressed by the scope of work here. If possible, I will apply for an internship here next summer too.

☞ From page 6

Summer internships attract talented students

ness atmosphere;

- To get new ideas and unconventional solutions from people who haven't been influenced by traditional ways of thinking;

- To monitor interns' performance so as to offer them full-time positions in the future.

Kozloduy NPP announced its internship program for the first time in 2005. In order to get more publicity and a larger number of applicants, the company announced the internship program on www.jobs.bg where positions in various fields were listed: nuclear technology and nuclear energy; power generation and equipment; electronics; architecture; psychology and economics. All applications were considered and evaluated according to different criteria, and the successful candidates were invited to start their summer

internships here. Students were hosted in various company structures and each of them spent three weeks at the company.

All the interns prepared specific projects on assigned topics. They were supervised by Kozloduy NPP specialists. The students had to have a public presentation done before their peers in the first half of September. Supervisors said that the interns have approached their tasks conscientiously with enthusiasm and ambition.

During the internships the participants were paid and were given the opportunity to have the same social benefits as other employees.

Most of the interns said they found their programs very motivating and gave them an opportunity to apply their knowledge in real life.

Public debate on Dry Spent Fuel Storage

On August 24, 2006 the House of Culture in Kozloduy hosted a public debate on the report on the environmental impact assessment of dry spent fuel storage. This was related to the Kozloduy NPP's development proposal for construction of such storage on the plant site. This facility will store spent nuclear fuel from KNPP in the future.

The public debate was initiated by Kozloduy NPP, as an investor, and by the Municipality of Kozloduy pursuant to the Environmental Protection Act. Representatives from the Ministry of Environment and Waters and the Regional Inspectorate on Environment and Waters attended the event. Also, there were representatives from the European Bank for Reconstruction and Development, the Nuclear Regulatory Agency, the Kozloduy International Decommissioning Support Fund for Units 1 and 2, and from Women in Nuclear (Bulgaria).

Various technical characteristics of the facility were presented to the public at the debate. The potential impact on the environment was widely discussed by experts and the community. According to experts from NNC, Great Britain, who wrote the report, any negative impact on the environment and human health is within permissible limits. Questions were asked regarding technical details of the future dry storage. The experts answered all questions in detail.

The present people were also familiarized with the position of the Municipality of Kozloduy which approved of the experts' conclusions. It was emphasized that the construction of a dry storage doesn't contradict the interests of the community.

FACTS AND FIGURES

The Dry Spent Fuel Storage will be situated on the plant site near the now existing Spent Fuel Storage Facility (pool type). The construction site has been approved by the Nuclear Regulatory Agency. The project is financed by the Kozloduy International Decommissioning Support Fund for Units 1 and 2 through the European Bank for Reconstruction and Development. It's managed by the Project Management Unit at KNPP, a consortium of BNG and EDF. The storage will be built by a NUKEM-GNB consortium. The first stage of the construction will be finalized by January 2009. This type of facility is considered to be the most modern method in the worldwide practice in spent fuel management. It ensures a long-term safe storage of spent nuclear fuel for over 50 years. The facility will have a capacity of 2,800 spent fuel assemblies from VEER-440.


KOZLODUY NPP REVIEW


is an abbreviated version of *Parva Atomna*, the official digest of Kozloduy Nuclear Power Plant. Reproduction of texts is permitted, provided our publications are quoted as the source.

Edited by Dimitar Lazhov

Kozloduy NPP plc
Kozloduy 3320
Bulgaria

Info Center:

 ++359 973 7 2100

 ++359 973 7 6107

fax: ++359 973 7 6019

e-mail: info@kznpp.org

www.kznpp.org

Please recycle. Save power and forests.