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## **Nuclear Power in Ukraine: Past, Present, Future**

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### **Nuclear Power in Ukraine: Growing up**

Development of nuclear power in Ukraine started when the first nuclear power unit was commissioned at Chornobyl nuclear power plant in 1977. This significant event took place within 23 years after commissioning of the first nuclear power plant in the USSR.

In the 1970 - 80s, nuclear power was rapidly growing in Ukraine.

At that time, nuclear power units were intensely constructed and put in operation on Chornobyl, Rivne, South-Ukraine, Zaporizhzya and Khmel'nitsky nuclear power sites.

The events of 1986, the accident occurred at Chornobyl NPP, retarded to a large extent the nuclear power sector's progress. Since 1991 to 1993 a moratorium on new nuclear power facility construction was effective in Ukraine leading to a slowdown in Ukrainian nuclear power and industry development.

This situation raised a number of the following social problems for the nuclear power sector which were added to the traditional technical and economic ones, that is safe, reliable and competitive operation of NPPs.

### **Vital problems to be solved:**

- Undermined confidence in nuclear electricity generation.
- Massive out-flow of highly skilled and experienced personnel due to the affected prestige of their profession and, subsequently, declined level of living.
- Re-orientation of nuclear and building industrial enterprises because of the lack of orders, creation of new jobs for personnel.

## **Ukraine' s Nuclear Power Sector Today**

### **National Nuclear Energy Generating Company “Energoatom”**

To the Ukrainian nuclear power sector's credit, even in such difficult conditions Energoatom managed to survive.

Today the nuclear power facilities in Ukraine, namely: 12 VVER-1000 units and two VVER-440 units with total installed capacity of 12 835 MW operate safely and reliably providing 50% of electricity produced in Ukraine.

### **Contribution of NNEGC Energoatom to the power industry in Ukraine**

From year to year the share of electricity produced by nuclear power plants is increasing in the overall balance of the electric power generation in Ukraine.

### **Electric power production by NNEGC Energoatom**

The effectiveness of the NPP performance also improves with the load factor increased from 73.5% in 2003 up to 80.4% in 2004.

### **Load Factor of Ukrainian nuclear power plants**

It should be pointed out that in Ukraine, the nuclear power sector occupies a top position in the overall structure of the Fuel and Energy Complex. It represents a stabilising factor of the social and economic development of our country.

This holds us liable to focus major attention on the technical status of nuclear power plants, their safe and reliable operation.

### **Pursuant to the Ukrainian law**

In accordance with the Ukrainian Law on “Nuclear Power Utilisation and Radiation Safety”, NNEGC Energoatom has assumed full responsibility for the safe operation of its nuclear power plants and set the highest and unconditional priority of ensuring safety over other tasks.

### **Events occurred in NPP operation**

Since 2002 NNEGC “Energoatom” has been implementing a large-scale “Comprehensive Program” on the safety improvement of operating nuclear power plants. This Program that was approved and continuously monitored by the Government of Ukraine has confirmed once more a paramount attention paid by our State to the NPP safety issues. The Program includes 400 measures on unit equipment and system upgrading aimed at the safety improvement.

### **Comprehensive Program**

Implementing the “Comprehensive Program” strengthens the confidence that running units of Ukrainian NPPs will operate safely during their designed service-

life (30 years) and enables us to set-up a task to develop measures on this term extension.

### **Achievements of the nuclear power sector of Ukraine**

Today all necessary conditions have been established for effective functioning of the nuclear power sector, that is:

- Nuclear power sector of Ukraine operates in a safe, reliable and open manner for the whole society.
- The comprehensive safety analysis has been performed for nuclear power units. The programs on safety improvements of Ukrainian nuclear power units are in progress now.
- Measures are being implemented for operating NPPs to validate their service-life extension.

### **Achievements of the nuclear power sector of Ukraine**

- The nuclear power personnel training system has been established with the full-scope simulators installed on all nuclear power sites.
- Ukraine became a party to international conventions on nuclear and radiation safety.
- Ukraine has established the nuclear legislation that complies with all international codes and standards.

### **Tasks and prospects of the Ukrainian nuclear power industry**

Now, a few words about the prospects of nuclear power development. This is the future of our state.

Among the first and foremost objectives to be achieved by the nuclear power staff today and in near future (2004-2011), the following tasks should be highlighted:

- Adopting the National Program “Energy Strategy of Ukraine until 2030 and beyond”.
- Improving the safety and operational reliability of running nuclear power units by implementing the Comprehensive Program of Modernisation and Safety Improvements of the NPPs of Ukraine.
- Commissioning Khmelnytsky Unit 2 and Rivne Unit 4 in 2004.
- Reforming the nuclear power engineering and nuclear industry personnel training system.

## **Tasks and prospects of the Ukrainian nuclear power industry**

- Improving the working and living conditions for the employees of nuclear power plants and other nuclear industry enterprises for the purpose of attracting well-skilled and qualified personnel, in particular, young people, and securing the nuclear safety.
- Creating a network of crisis centers to ensure emergency preparedness and response and to minimise possible consequences of nuclear terrorism.
- Solving issues of spent fuel and radioactive waste by long-term disposal on the territory of Ukraine (2008).
- Building replacement capacities equipped with the 3rd generation reactors to become the basis of Ukrainian nuclear power engineering after 2011.

### **Khmelnitsky-2/Rivne-4 Project**

One of the forthcoming top priority tasks that the President of Ukraine set to the Company is commissioning of Rivne Unit 4 in September 2004. On August 8, 2004 Khmelnitsky Unit 2 was connected to the grid.

Pre-commissioning peer review missions of WANO have confirmed that these units are ready to start-up having sufficient safety level. However, we do not rest on our laurels. We have already developed and now implementing the program to upgrade equipment of these new units. The international experts, who audited the measures included in this program, confirmed that the safety of nuclear power units under commissioning complies with international safety standards.

### **Co-operation with Euroatom and EBRD**

We highly appreciate the participation of EBRD and Euroatom in the project on new power unit upgrades which are to be implemented after their commissioning.

In July 2004, as a result of successful negotiations with EBRD and Euroatom, the Loans Agreements amounting to USD 125 million have been signed. Having signed these agreements we are able to modernise Khmelnitsky-2 and Rivne-4 on short notice. This also provides a possibility of allocating additional funding for safety improvements at other nuclear power units.

### **Nuclear power - strategically important sector**

The new generation nuclear power plants with upgraded safety level and improved economic effectiveness shall lay the basis of the Ukrainian nuclear power sector in future.

The major task in this area is making the most use of existing sites. This is, first, Khmelnitsky site where a part of civil works have been already completed for Units 3 and 4. The feasibility study has been started for Khmelnitsky Unit 3.

The nuclear power sector is strategically significant for Ukraine. Building up generating capacities, improving nuclear power plant effectiveness is a guarantee of the Ukrainian economic upswing and stable development.

Summarising my presentation I would like to express my confidence that despite all existing problems we face now, the nuclear power sector of Ukraine will continue developing in the third millennium. And this, in its turn, will give a strong innovative impetus to expand all business and sectors supporting its activity.

Thank you for your attention.