



krško
nuclear
power
plant

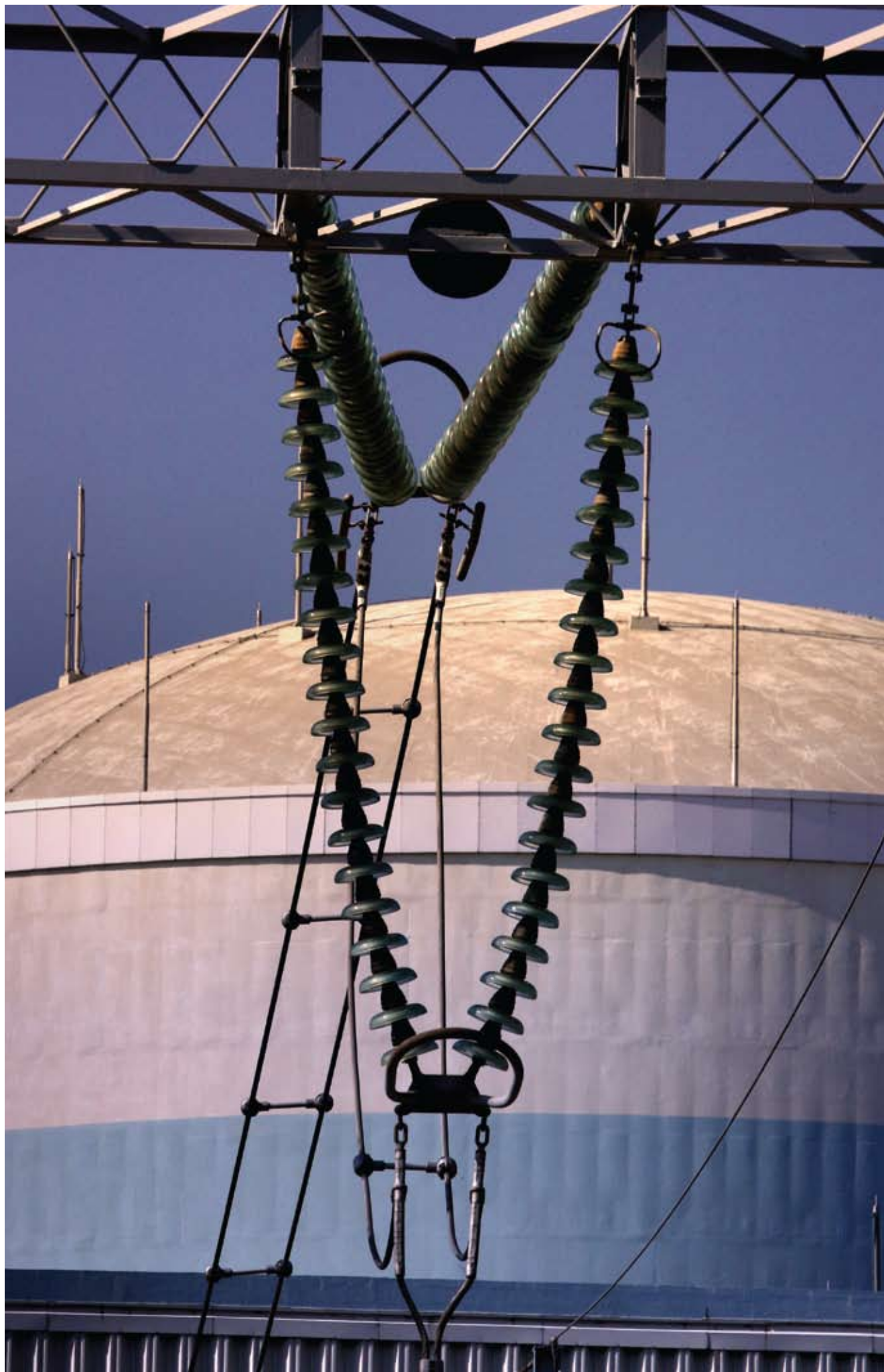


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annual
report
2008





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Dear reader,



This Report provides an outline of achievements and crucial events which took place in 2008. It is with a sense of satisfaction that we establish that the operational and business outputs have been achieved at the expected levels; moreover, some targets have been exceeded. This made our mission concerning the safe, reliable and competitive operation complete, and the provisions of the Intergovernmental Agreement respected.

The 2008 operations were without an annual outage; therefore, the plan availability reached a noteworthy level of 98 percent, without automatic shutdowns and with one forced shutdown. The output was 5972 GWh of electric power at a high level of safety systems availability. The effects on the environment were below the administrative limits. We continued to invest in upgrading technological systems. Major completed projects included extension of the cooling towers system, replacement of technological cooling units and the ageing management programme for systems, structures and components, which is a basis for the plant life extension. ●

A very high level of safety culture was achieved, reflected in various managerial decisions, systematic approach to training, independent evaluation of work processes, operational supervision and the maintenance activities carried out. Special appreciation should be given for enthusiasm and openness in plant condition reporting, responsiveness of all staff in problem solving, and the orientation towards learning and understanding professional challenges. ●





Significant improvement in the Corrective Action Programme and Pre-outage Activities Plan were achieved. The number of open analyses was reduced by 30 percent in comparison with the previous year. The project readiness for the outage was also raised to a higher level. All contracts with external contractors were concluded in time, thus enabling the timely completion of preparatory work.

Our cooperation with administrative bodies and company management bodies as well as with other organisations which support our programmes was excellent.

A very high level of understanding concerning the provision of financial sources for the realisation of services and investments in the context of the plant life extension, procurement of fuel and equipment, was attained. We worked closely together with the Slovenian Nuclear Safety Administration (S.N.S.A.) in preparation for legal regulations and thus made a contribution to their quality, implementation and acceptance in practice. ●

The recruitment process was resumed in hiring key staff to ensure safe and stable operations. All employees had a chance to pursue personal development by means of systematic training and additional education. Our position regarding post graduate studies was reevaluated by offering encouragement and remuneration. Knowledge was exchanged and shared via international links. We worked on developing working environment and relationships which encourage creativity and enthusiasm of individuals. ●



In terms of business results for 2008, all targets of the business plan were achieved. The realisation of the cost price per kWh was slightly lower than the budget figure. Long-term debts were reduced to the extent planned. All planned investments were realised. The resources available were managed economically and effectively. Successful business results gave a positive balance between income and expenditure; therefore, in accordance with the Articles of Association of Krško Nuclear Power Plant (NEK) the payments were made in favour of the company owners. ●

NEK Management Board



important achievements in 2008 and challenges for 2009

Krško Nuclear Power Plant (NEK) has been in commercial operation for 26 years. The results achieved during this period are proof that we are able to operate the demanding technology and that the right decisions have been made. Our commitment to development, an active role in international links and internationally comparable operational indicators prove that we take our part responsibly in the frame of global nuclear safety and support in expansion of the nuclear option.



Due to the 18-month fuel cycle, there was no outage shutdown in year 2008. NEK supplied the power grid with 5,972 GWh of electric power which is the highest plant annual production ever. Accompanied by safe and stable operation, with no automatic shutdowns and with one unplanned plant shutdown, the production plan was exceeded. With its high efficiency and stability in operation, NEK provided a reliable supply of electric power and enabled positive effects in the market for both electric power systems.

Only those modernisation activities were undertaken which had no detrimental effects upon safe plant operating. The two are connected with the environment. The cooling towers system extension project was successfully completed; this will provide a lesser dependence of the plant on favourable weather conditions and low Sava river flow, thus contributing to a higher availability of the plant. The Sava water-chilled cooling units have now been replaced with air-cooled units using an ozone-safe cooling agent. ●

The recognition of our responsible stance towards the environment is reflected in the attainment of ISO 14001:2004, the certificate on fulfilment of environmental standards. The plant and authorised institutions monitor the effects on the environment, and so far all the effects have been below administrative limits. The most widely used environmental standard provides for additional assessment and transparency. At the same time it is a challenge for the staff and encouragement to implement a respectful attitude towards the environment in their everyday life, as for example waste separation. ●





The 23rd fuel cycle will end with the start of the 2009 outage, which is the third 18-month cycle. The outages are extremely labour intensive periods in the extended cycle conditions, as these cycles necessitate the refuelling, preventive inspections and maintenance work, and system and equipment upgrading and modernisation to be all completed in 30 days. The plant ageing and high operational standards represent additional challenges and result in a continual increase of investment and other operational activities. In order to ensure that these processes are completed successfully, within the set deadlines, while maintaining permanent nuclear safety, there is a high demand on the NEK and subcontractors' staff to work as a team and to be well prepared, organised and focused. Only strict and first-class performance of the planned activities can be a basis for good operational results in the subsequent fuel cycles.

The decision of the owners to proceed with the initial measures for plant life extension places new tasks upon us concerning the course of decision-making and the plant equipment and processes upgrading in the future. ●

Public exposure of nuclear technology is a constant. This exposure motivated NEK to achieving high operational standards, which is the basis of our attitude towards work. Operational excellence, an indicator of high nuclear safety, has been our permanent challenge. Such an approach necessitates a critical consideration and motivation to seek better solutions by every employee. We realise that on this path each step counts. ●



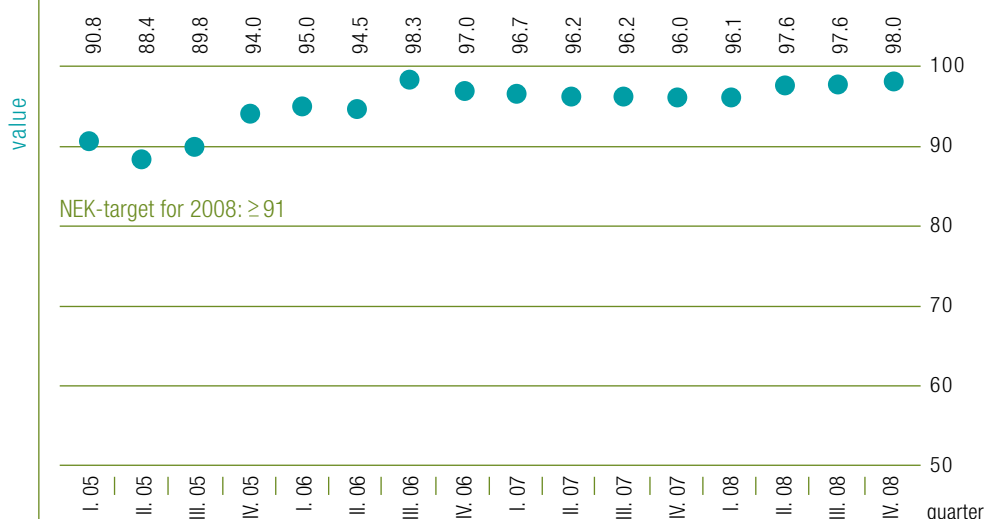
The year 2008 was a successful year for NEK from both operational and financial points of view. The output was 6,272.80 GWh of gross electric power at the generator output, or 5,972 GWh of net electric power. This annual production was by 1.39 percent higher than the planned figure (5,890 GWh) and is the highest-ever annual output in the history of the plant, and is by 1.06 percent higher than the last highest figure in 2005. The availability indicator was at the level of 98.7 percent in 2008.



There was no outage in 2008. There was one unplanned shutdown; due to a leak of the primary coolant inside the containment, the reactor was manually shut down on 4th June. It was put back into operation on 9th June. The nuclear and radioactive safety during this event was not affected.

In order to facilitate the performance monitoring and benchmarking, a performance indicator index was established, calculated using weighted values of individual factors and whose value is from 0 to 100. The target figure for 2008 performance indicator index was ≥ 91 , while the actual achieved value was 98.

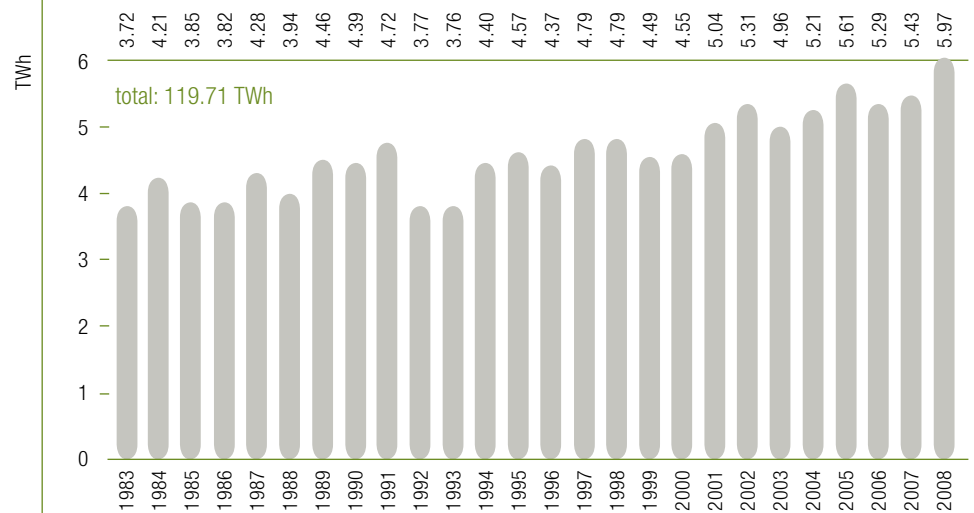
performance indicator index



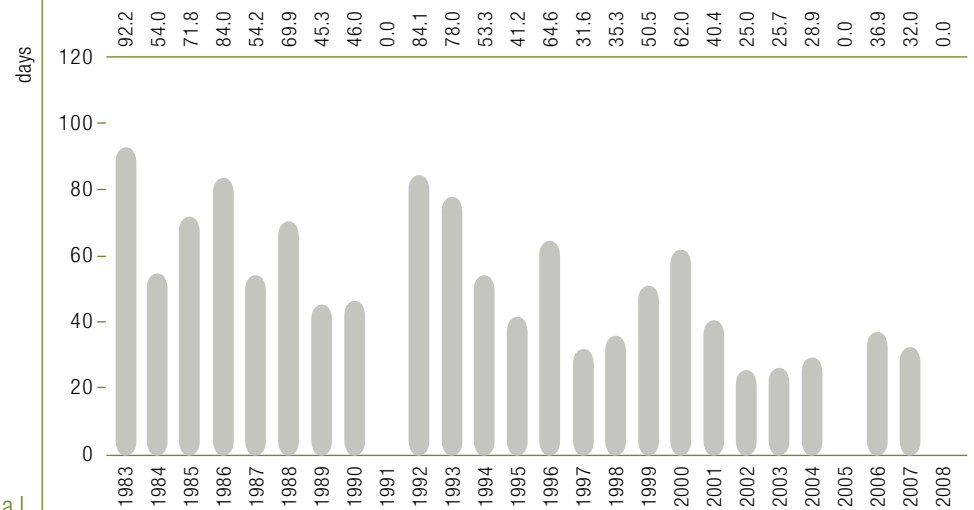
Note: The diagram is based on new weighted factors for individual indexes



annual output



outage duration





The high performance figure is the result of first-class maintenance and operation supervision, relevant technological upgrading during a long period of time as well as optimum hydro meteorological circumstances which enabled operations at full capacity throughout the year. The expertise and high skills of NEK staff as well as long-term contractors have been recognised as the key prerequisites for high performance.

NEK's operation was stable and in accordance with the requirements set by the Slovenian legislation and international regulations and standards.

The ageing management programme for systems, structures and components (SSC) was prepared on the basis of American standards used for the plant life extension application. The NEK ageing management programme project included the scope, analyses and listing of all SSCs, time-dependent analyses and changes in the processes and documentation of NEK. After the review, an action plan was prepared; its implementation will represent the basis for the extension of NEK's operational life.



Operational events

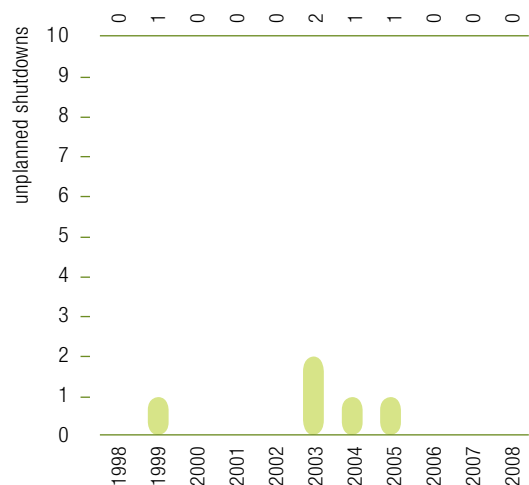
The most important event was the plant shutdown in June.

Due to a minor leak of the primary coolant in the containment, the reactor was manually shut down in line with the normal operational procedures on 4th June. ●

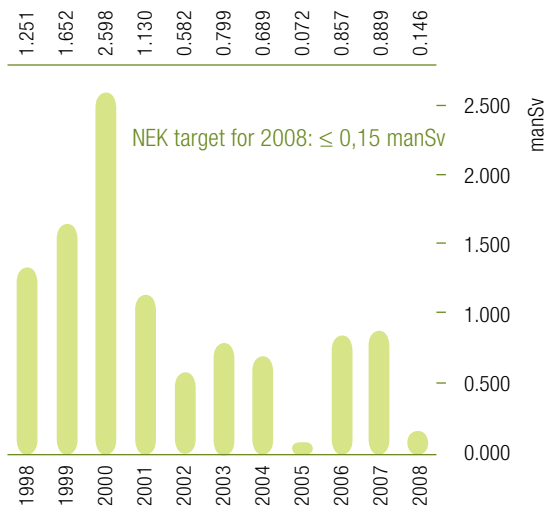
The leak was identified in the isolating valve of the 2-inch line of the primary cycle temperature measuring system. No other failures or irregularities were identified, the safety systems did not activate nor was there any need for them to be activated. After the successful replacement of the valve, the plant was put back into operation on 9th June.

According to the criteria of the International Nuclear Event Scale (INES), the event was classified as the lowest level event – level 0, i.e. with no safety significance. ●

number of automatic
reactor shutdowns
in the last decade



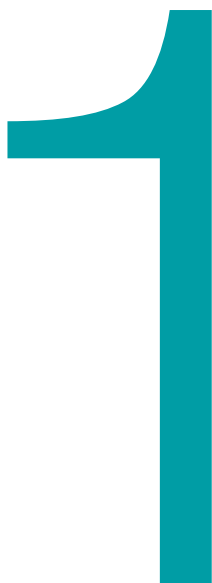
collective doses



In the year 2008, the liquid and gaseous radioactive discharges, as well as heat impact on the River Sava, were kept within the allowed administrative limits. An amount of 27.5 m³ radioactive waste was stored, while the personnel radiation was 0.146 man-Sv.

Most of the targets in the area of performance indicators as set by the industry for 2010 and defined by the World Association of Nuclear Operators (WANO) were achieved. Special mention should be made of the good results concerning Fuel Reliability, Unplanned Automatic Scrams per 7000 Hours Critical, and Safety Systems Performance. ●

Notwithstanding the results achieved, NEK recognizes the need for constant improvement in all areas. For this reason, the attitude towards the environment is a part of business policy, while its priority remains safe and stable operation. To evaluate and improve the environmental practices, a decision was made to implement ISO 14001:2004, which is internationally recognised as the most widely used environmental management standard. ●



NEK carries out radioactive measurements of the waste water discharges into the River Sava and emissions from the ventilation system into the air. An extensive programme of radiation surveying is carried out by NEK and other independent institutions in the surroundings and from samples taken from the surroundings, in particular in the area around NEK within a distance of 12 kilometres. In addition, there are 13 automatic radiation survey stations located in the vicinity of the power plant which can detect any change in the natural radiation due to precipitations as well as potential changes due to the nuclear facility. The River Sava is monitored downstream for 30 kilometres from the plant.



The objective of the radiation monitoring is to monitor the plant operations and assess the impact on the surroundings and the local population. This is also the basis for verifying compliance with legal limits.

The effects on the population are so low that they are practically immeasurable. However, they can be calculated by models for the most exposed groups of the population and the annual dose can be compared with the dose received due to natural and other radiation sources. The assessment of an individual dose received by a reference group (an adult receiving the highest doses and whose food originates exclusively from locally grown food and fish) shows that the annual dose of such an individual is less than 1 μSv or that it is less than 0.1 percent of the dose on average received by a person due to natural sources of radiation (2.5 mSv). The results of measurements taken are dealt with in detail in a special report for 2008, prepared by the *Jožef Stefan* Institute together with the Institute for Occupational Safety, and the *Ruder Bošković* Institute. ●



Liquid radioactive discharges

Wastewater may contain fission and activation products. In 2008 the activity of fission and activation products (excluding tritium H-3, carbon C-14 and alpha particle emitters) amounted to less than 0.1 percent of the annual limit for liquid discharges. The activity of discharged tritium was approximately 15 percent of the prescribed annual limit. Tritium is a hydrogen isotope found in water and, in spite of being more active than other contaminants, it is less important due to its low radiotoxicity.

The plant observed technical norms which require that in any (although brief) discharge of such wastewater the concentration of radioactivity in the channel does not exceed the prescribed limits. ●



data on radioactive liquid discharges in the year 2008

radioactive substances	annual limit	released activity	percentage of the limit
fission and activation products	100 GBq	85 MBq	0.085%
tritium (H-3)	45 TBq	7.02 TBq	15.6%

Radioactive releases into the atmosphere

The dose as the result of the total annual activity of discharged noble gases was less than 0.2 percent of the annual limit.

The activity of discharged radioactive iodine, with regard to the annual limit on the iodine I-131 activity equivalent, was negligible. Radioactive isotopes of cobalt and caesium, which take the form of dust particles in the air, were detected in extremely low concentrations. Detailed information is shown in table below.

The plant's specifications were taken into account, therefore the radioactive concentrations in the air/dose rate within a 500-metre distance from the reactor did not exceed the prescribed value.

Dose in the environment

The annual dose limit of 50 μ Sv in a 500-meter distance from the reactor is checked monthly for the release into the air by calculating a dose that could have been received by a person at such distance in one year due to external and internal radiation. The least favourable monthly average rarefaction values and releases near the ground are taken into account for individual wind directions. The result for 2008 was 1.45 μ Sv (2.9 percent of the annual limit).

data on radioactive releases into the atmosphere in 2008

radioactive substance	annual limit	released activity	percentage of limit
fission and activation gases (total)	dose < 50 μ Sv	0.27 TBq	0.128%
iodine (I-131 and others) (I-131 equivalent)	18.5 GBq	0.4 kBq	2.2 E-06%
dust particles (cobalt, caesium etc.)	18.5 GBq	0.98 MBq	0.0053%
tritium (H-3)	-	2.9 TBq	-
carbon (C-14)	-	26 GBq	-



Measurements of the River Sava and groundwater

Prescribed measurements of temperature, flow rate and oxygen concentration in the River Sava, and monthly measurements of biological and chemical oxygen consumption were carried out.

Not more than a quarter of the Sava flow can be diverted for power plant cooling. The increase in temperature of the River Sava after mixing did not exceed the permitted limit of 3° C.

Groundwater is regularly inspected by NEK who constantly measures the ground water level and temperature in three boreholes and two locations on the River Sava and, on a weekly basis, in ten boreholes in the Krško-Brežice plain. The conditions remain unchanged: however, a slight rise of the groundwater level was detected which was due to precipitations.

Data on radioactive waste and spent nuclear fuel

In 2008, 69 various-size drums of radioactive waste were generated to a total volume of 27.5 m³. The overall volume of radioactive waste stored in the interim storage is 2,327.2 m³, while the total activity is approximately 20 TBq. The storage is approximately 90 percent full.

The spent fuel storage pool contains 872 spent fuel elements from the previous 22 fuel cycles. The overall mass of spent fuel material is 336 tonnes.

Communal waste

In 2008 waste separation practice was introduced in line with an ISO 14001:2004 requirement.

A special waste water treatment plant is used for waste water. Twice a year, measurements of pH, temperature, non-soluble substances, chemical use of oxygen and biological use of oxygen at the outlet of the waste water treatment plant are taken.

maintaining and improving high levels of nuclear safety



NEK pays special attention to ensuring and checking the execution of regulations and standards for nuclear technology, as well as other modern technologies in project solutions (equipment upgrading), operation and maintenance activities, the purchasing process and other activities which contribute to safe plant operation and the safety of the population.



We are committed to on-going improvement, professional work and personal growth. Our mission is performed through independent review, on-going improvement of human performance and safety culture, critical self-assessment of results achieved, constant comparison with the best comparable facilities in the world, by learning from both in-house and foreign operating experience, and on-going plant assessment in terms of plant operation safety and stability.

The improvement and upgrading of the quality system is an on-going process in this company. Another achievement on which we pride ourselves is that our chemistry laboratory has received another American recognition "Best of Set" for power plants with pressurized water reactors which take part in the international system of inter-laboratory comparison measurements, as the laboratory which exhibited the most accurate results among 36 nuclear power plants.

Due to its specific nature, NEK took an especially cautious stand towards the environment at an early stage of the project (extensive research concerning its location prior to a final decision, strict respect of standards during construction). During the plant start-up and its operation, independent monitoring of the effects on the environment was put into action (radioactive releases into water and emissions into the air, and nuclear fuel and hazardous waste management). A Protection and Rescue Plan for emergency events was prepared, detailing the organisation, measures and means of emergency management when there is a potential danger of radioactive effects on the environment. Care for the environment has always been a special concern of the plant's business policy.

In order to assess and improve the NEK practices concerning the environment, a decision was made to acquire the ISO 14001:2004 standard, internationally the most widely recognised environmental management system.





The project group prepared the Environmental Management System manual specifying all elements of this ISO standard and follows its requirements, gives the description of all main elements of the system and its links, and gives references to other documents. The initial audit took place in October, followed by a certification audit in December by Bureau Veritas, who certified that the system had been successfully implemented as described in the manual. On 19th December certificate ISO 14001:2004 was issued.

NEK has been continually compared with the best power plant facilities in the world. Thus, there was a benchmarking in 2008 undertaken between NEK and two American power plants concerning quality control and receiving inspection.

We were paid a visit by the representatives of the German Gundremmingen power facility for operations issues, Slovak Bohunice and Mohovce for nuclear safety assessment, and Brazilian Angra facility for fire protection. ●



WANO Peer Review Follow-up

In December a Peer Review Follow-up was carried out at NEK by the World Association of Nuclear Operators (WANO). The objective of this review was to verify that the recommendations of the 2007 mission has been carried out. Our practices were compared with the highest world standards, which have always been the target of the nuclear industry. In all areas for improvement, the mission found progress. In most areas, the assessment of the mission was good, while the improvements in approximately 10 percent of the areas will be completed in the near future. ●





Self-assessment

NEK uses various tools to improve nuclear safety. Special emphasis has been laid on implementing self-assessment as one of the key elements in achieving process improvements and in the objectives set. Self-assessments involve the evaluation of programmes, processes and lines of work in NEK. This includes the comparison of existing activities with executive expectations, best industrial standards and regulatory requirements to detect less apparent deviations or trends. Early correction of negative deviations or trends prevents the development of more acute problems which could seriously affect power plant safety, operational reliability or compliance with regulatory requirements. ●

Team self-assessment related to the NEK's modification process was carried out, including the solution concept, project documentation preparation, execution, testing and putting modified systems, components and structures into service. All organisational units taking part in the process were involved in the self-assessment.

The results of self-assessment showed that the NEK's modification process is well defined; however, it can be improved. It would be advantageous to increase the supervision over the overall modification process. NEK has already improved procedures and instructions in order to ensure improved modification. ●



major technological upgrading and modernisation



There was no outage in 2008, therefore only those technological upgrades were carried out which necessitated no plant shutdown. There were 20 systems and components modifications. The major ones included the following:



Cooling towers system extension

The planned project change was due to the changes in the plant and environment. The selected technical solutions resulted in NEK's improved tertiary cycle cooling system. An electric-motor driven lock-gate in the tower-pump station channel for condenser cooling water and new water spray nozzles in the existing towers were installed. Four new cooling cells were fitted (a new cooling tower - CT3) and the entire electrical equipment in the cooling towers system was replaced. The construction was completed in May, while testing took place in June and July. The modification was completed by the end of July, and thermal characteristics testing was carried out in August. The thermal features of the new tower and the overall cooling towers system are in line with contractual requirements.



Upgrading the cooling units in the chilled water system

The aim of the replacement of the cooling units in the chilled water system was to:

- cease using the prohibited R12 cooling agent in line with the Montreal and London Agreements, as amended (Copenhagen and Vienna) accepted by the Republic of Slovenia;
- limit the R12 quantity in NEK warehouse which could in the long-run jeopardise the plant operation;
- solve the spare part procurement problem for the existing obsolete cooling units;
- avoid frequent maintenance interventions on the units (cleaning exchangers) due to sedimentation, sludge and biological material deposits in the cooling unit condensers;
- avoid the cost of complex maintenance undertaking on the units after a 25-year operation;
- stop using the River Sava water for cooling the condensers of cooling units and unburden the essential service water system.





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All the above aims were achieved with the modification. The Sava water chilled cooling units were replaced with the cooling units by the same manufacturer (AAF/McQuay), cooled by air and which use ozone-safe cooling agent R134a. The cooling units (compressor-condenser parts) are installed on the west side of the component cooling building inside a special concrete barrier. The steam generators of cooling units and new motor control centres are inside the component cooling building at locations of previous cooling units. Steam generators and the external part of the cooling unit are connected with stainless steel pipes. The R134a cooling agent suction pipes are additionally thermally insulated and protected with aluminium coating. The operation of the new cooling units is connected with the NEK process information system, thus making it easier for the operators in the main control room and for maintenance staff to monitor the operation and parameters, which in turn enhances operational safety and reliability of the units. ●

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Lifting platform for load transport in the turbine building

Due to overload of the turbine lift, in particular during outages, and to avoid using this unsuitable personnel lift in the turbine building for transporting cargo, a new lifting platform was purchased for lifting loads in the turbine building.

The selected platform ALIMAK CM15/60 was installed, with load bearing capacity of 1,500 kg and a size of 6 m x 1.5 m, equipped with a 4 m long loading and exit ramp. The platform is located in the turbine building and enables transport of loads to the first and second level.

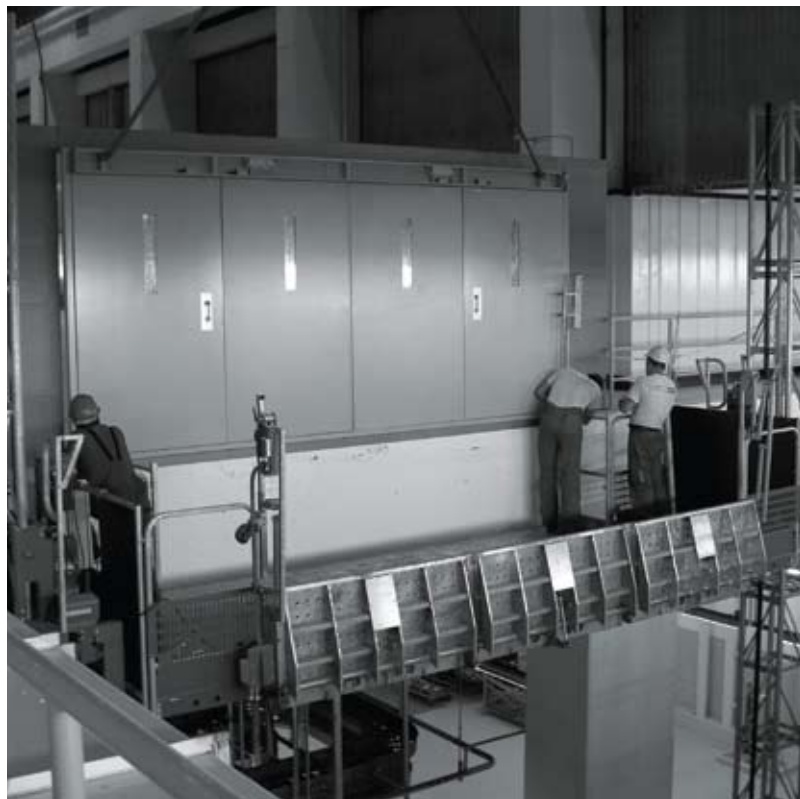
Relevant fundamental training was also conducted. ●



Computer network extension within NEK buildings following the installation of “nekomats”

In line with the NEK strategy of applying new options made available by business information system, the internal internet (intranet) network was extended and information booths (“nekomats”) which will enable the use of intranet and existing information applications of MIS - Management Information System (DCM, MECL, etc.) were placed. The extended intranet and “nekomat” network will be used primarily for information purposes; however, further applications are expected to be developed leading to “nekomats” being used for transfers or interactive exchange of data. “Nekomats” were installed in the turbine building, circulating water system building, in the auxiliary building and near the activity control centre. ●





3



Procurement and use of containers and tools for fuel elements reconstitution in the Spent Fuel Pit

This modification is a part of the fuel elements reconstitution project and was carried out to determine the root cause of poorer integrity of fuel in the past. The fuel rods which are withdrawn out of the fuel assembly and the locktubes which are removed prior to disassembly of the top nozzle had to be stored in suitable containers. As there was no appropriate storage for individual fuel rods and waste material, two suitable containers were ordered to accommodate safe and permanent storage together with the required tools for opening the containers. The containers in the spent fuel pool were used during the fuel reconstitution process. ●



Replacement of the IAEA digital surveillance system in NEK

By Slovenia joining the European Union, the nuclear material safeguards in NEK changed. Until that time, the material was under the surveillance system of International Atomic Energy Agency (IAEA) in line with the INFCIRC/539 Agreement concluded between Slovenia and IAEA. With the implementation of European legislation 302/2005, covering the requirement concerning nuclear material safeguards, concluded between Slovenia / NEK and the European Commission, NEK is obliged to report on the nuclear material condition directly to the European Commission. This means that after the implementation of the tripartite INFCIRC/193 Agreement between the IAEA, the European Commission and Slovenia, the reporting responsibility on nuclear material was transferred from IAEA to the European Commission. ●



The European Commission therefore installed their own nuclear material surveillance system in NEK. The previous one, which IAEA had intended to dispose of due to their introduction of the integrated security system, was removed jointly by NEK, IAEA and the European Commission. It was replaced by a contemporary system to meet the requirements of both the European Commission and IAEA.

In the fuel handling building new digital surveillance equipment was installed and the old one removed. The replacement, handling and maintenance of the equipment are within the competency of the European Commission. ●



major maintenance activities and inspection of pressure boundaries

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Appropriate inspection, maintenance and upgrades ensure the operational status of equipment. Maintenance falls into the areas of preventive maintenance, carried out at specific intervals defined in programmes, predictive maintenance, which is used for establishing the status of equipment (diagnostics), and corrective maintenance, related primarily to equipment not crucial to the availability and safety of the power plant.



Corrective measures to important equipment which is part of the preventive maintenance programme are followed by a detailed root cause analysis and if necessary the preventive maintenance programme is revised accordingly.

The mechanical maintenance work was carried out on-line in accordance with the preventive maintenance plan. There were a few significant corrective activities undertaken, most of them on-line and some during the unplanned shutdown. Some major maintenance activities included the replacement of the diaphragm in various reservoirs and the overhaul of various pumps, compressors, valves and other components. ●

A major corrective activity was the repair of the leak in the isolation valve on the primary system temperature measurement line, which necessitated the plant shutdown and the primary system depressurization.

The highly professional response of the staff during the shutdown following the event, during the repair, cleaning and supervisory checks contributed to the plant re-start within optimal time period. ●





4



The electrical maintenance activities were also undertaken in accordance with the preventive maintenance programmes and plans. Standard preventive activities included preventive inspection of electrical equipment and surveillance testing of various batteries and relay protection. Overhauls and revisions were carried out on several high-pressure and low-pressure motors, circuit breakers and measuring transformers. No major corrective activities were undertaken. ●

The instrumentation maintenance involved regular testing of automatic reactor protection instrumentation and radiological surveillance. As there was no outage, the calibration and maintenance preventive activities were carried out during plant operation.

Predictive maintenance included the equipment condition identification on the basis of various techniques which are not part of the primary maintenance - thermo-visual surveillance, vibration surveillance of major rotating components and oil surveillance.

The activities concerning the integrity checking programme of components which represent the primary system boundaries, by means of non-destructive methods, were limited in scope. No deviations were identified. Following the inspection programme of secondary system components for signs of erosion and corrosion, their state was found to require no significant corrective measures. ●



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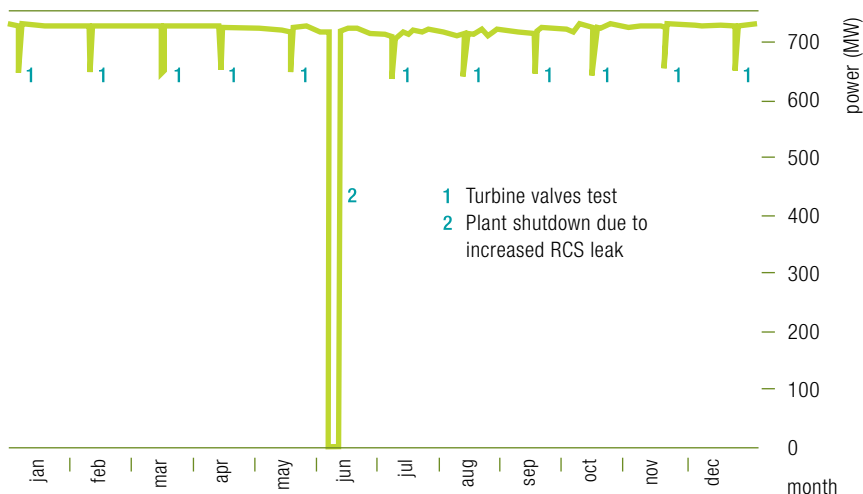
We achieved the highest annual output ever in the history of the plant's operation and exceeded the record output in 2005 by 1.06 percent. The availability factor was 98.7 percent and the capacity factor was 102.1 percent. The reference power of the plant used in the calculation of the capacity factor is defined at the least favourable external conditions. Due to good operating and favourable hydro-meteorological conditions the value of the factor exceeded 100 percent. ●

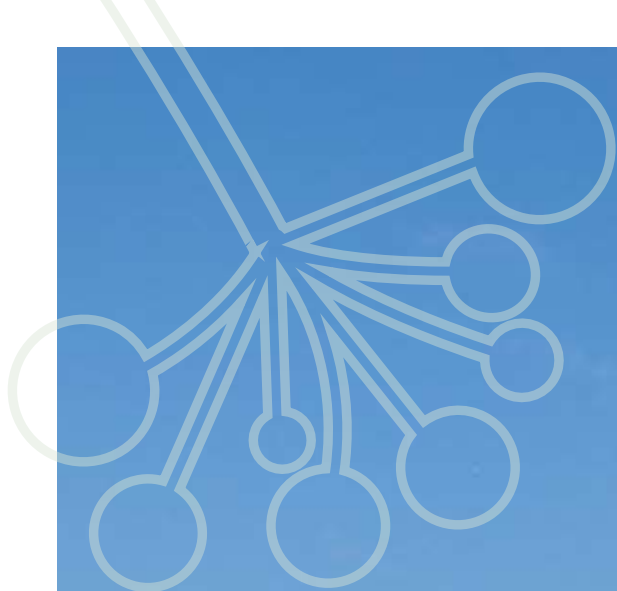
The year 2008 was very successful in view of both operational safety and reliability. The operation was stable and there was only one unplanned shutdown. Due to primary coolant leak the plant was shut down manually on 4th June and was put back into operation on 9th June. ●

output in 2008

Gross energy produced: 6,272,813.7 MWh
Net energy produced: 5,972,030.5 MWh
Availability factor: 98.7%
Capacity factor: 102.1%

The total 2008 output of NEK at the generator outlet was 6,272.8 GWh of gross electricity or 5,972 GWh net electric power, which was by 1.39 percent more than the planned output (5,890 GWh). ●





5



Projects

Within the scope of on-going technological modernisations there were a few project changes, including technological systems enhancement, additions and upgrading. These activities were the result of the company's own initiatives and need and also followed world trends in the field of nuclear technology. A total of 20 design changes were completed as well as all planned activities within the modification preparatory scope; the major activities included the replacement of the turbine and generator control system, and the replacement of the reactor head and the main generator stator.

Performance indicators of the World Association of Nuclear Operators prove that we achieved the majority of targets of the industry for 2010. In the field of unplanned loss of production and classic injuries at work we were close to target figures; however, these were not reached due to the earlier-mentioned shutdown and two injuries at work. ●

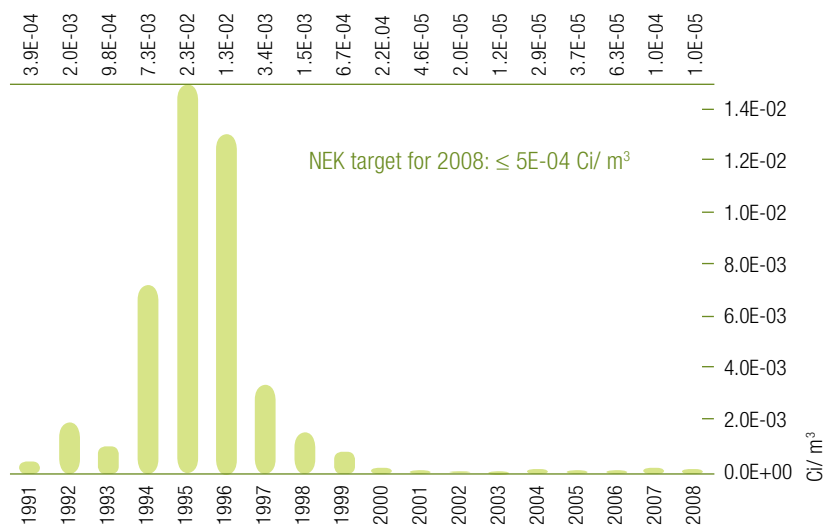
Nuclear fuel

The specific activity of the primary coolant and its contamination were below the required levels. The fuel reliability indicator (FRI) for 2008 was good as its value was less than $5E-04 \text{ Ci/m}^3$. The limit prescribed by INPO is at the same time our target value; the plant has been meeting this figure for over ten consecutive years.

Service and equipment purchasing

In support of the successful operation and power plant upgrades, all services and goods needed were purchased in a timely manner.

Cooperation with American suppliers for imports has been going from bad to worse as due to considerable investments into large new nuclear facilities, their interest in working with uninteresting small customers has been in decline. With high prices and advance payments they try to impose commercial terms and conditions which are contrary to the orientation and purchasing policy of this company. We attempt to overcome such difficulties by entering into long-term contracts with foreign suppliers. ●



Based on long-term contracts concluded with local strategic business partners from Slovenia and Croatia, these organisations carried and carry out important outage, continual and project services for NEK within the set time frame, at a high quality level and at competitive prices, at the same time supporting us in development.

Self-assessment of purchasing together with recommendations and the action plan of improvements contributed to a better understanding of roles and responsibilities of everyone in the process. One of the core measures in this respect will be organising central receipt of goods in NEK.

Timely inclusion of the purchasing function into the projects and outage preparatory work (gathering initial data, taking part in meetings prior to internal requisitions placing) contributed to enhanced purchasing documents preparation and negotiating position. ●

The long-term contracts for nuclear fuel (enriched uranium, fuel elements) continued to be successfully fulfilled. Contracts were signed for the main generator stator replacement, for 33 control rods, turbine pipes repair, supply and installation of a 110 kW switch as well as the outage and continual services for 2009.

With the plant ageing after years of successful operation, the quantity of non-standard equipment is increasing; this is equipment which is no longer a standard supplier's item. This results in: impossible purchases, longer delivery times and higher prices. In order to resolve this problem, the plant joined the nuclear specialist group (NUOG) and started the project of identifying the availability of spare parts for the originally supplied and now obsolescent equipment (Proactive Obsolescence Management Program). ●





Experience of others – guidance for our work

At NEK we are aware of the importance of joining international organisations and the international control of our operations. It is the only way to achieve internationally comparable operating and safety results.

WANO

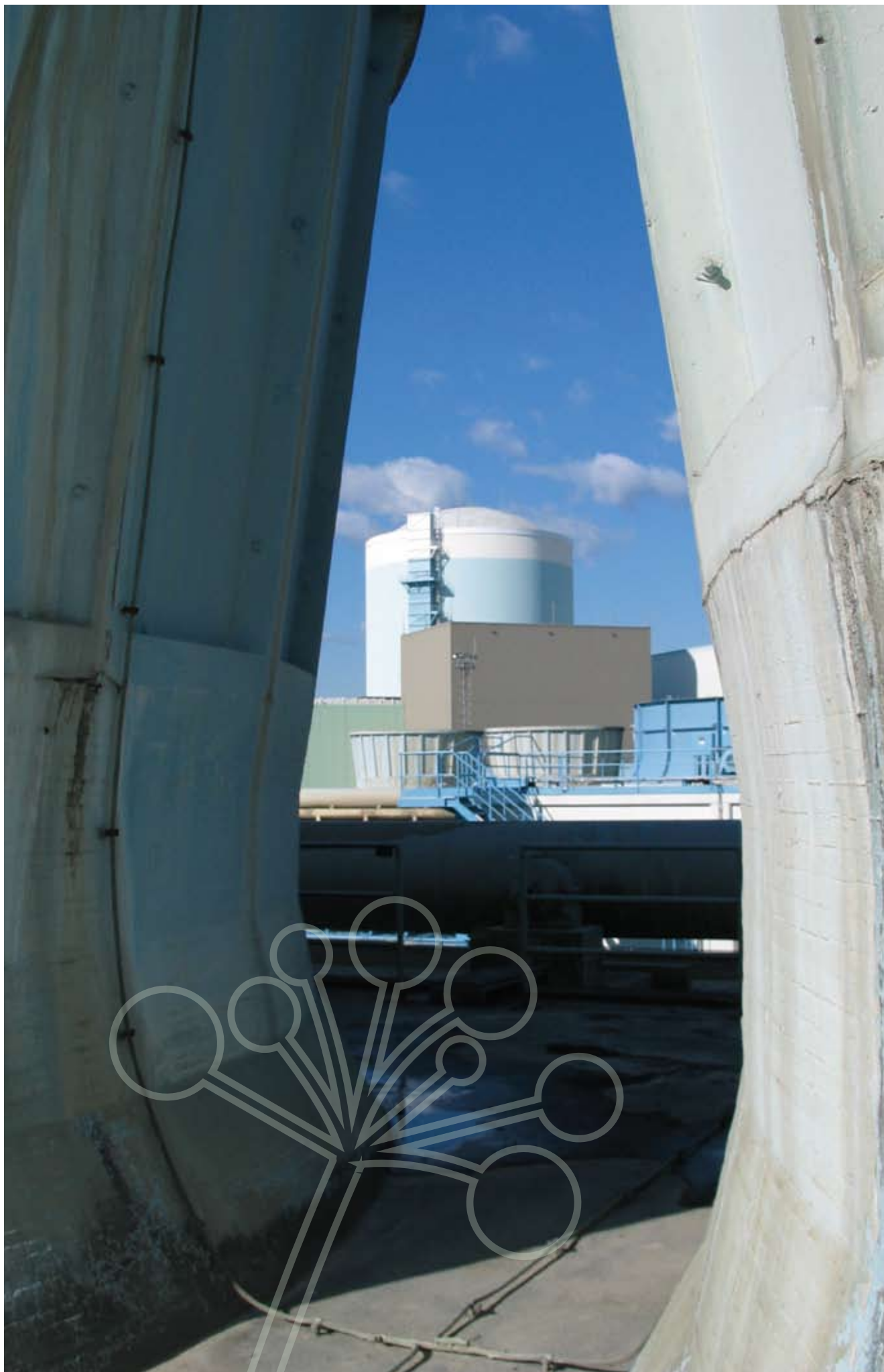
All nuclear facilities in the world are members of the World Association of Nuclear Operators (WANO). NEK joined this organisation as early as 1989. Its aim is to promote the highest standards of operational safety, availability and excellence of nuclear power plants. WANO supports several programmes for sharing information and the promotion of communication, mutual comparison and copying of best practice and solutions among its members.

INPO

From as early as 1988 NEK has been a member of the Institute of Nuclear Power Operations (INPO) in the USA. Its primary objective is to increase the level of nuclear power plant safety and reliability. All US organizations that operate nuclear power plants are INPO members. Its membership extends both to nuclear operating organizations in other countries, as well as to the manufacturers and designers of nuclear facilities. ●

MAAE – IAEA

The International Atomic Energy Agency (IAEA) is an independent intergovernmental organisation that operates within the United Nations Organisation. Its primary objective is to help members in planning and using nuclear technology for various peaceful purposes. These include electricity generation and technology / know-how transfer in the field. The IAEA develops safety standards that promote achievement of a high level of safety in the use of nuclear energy and in protection of the population from ionising radiation. The organisation operates on the basis of various programmes such as control over nuclear material, nuclear technology application, nuclear energy, nuclear safety and technical cooperation. As part of these programmes, the IAEA organises OSART (Operational Safety Review Team) missions which involve visiting power plants in order to inspect and assess their operational safety. ●





NUMEX

For over ten years, NEK has been a member of the NUMEX organisation (Nuclear Maintenance Experience Exchange) engaged in the exchange of experience in the sphere of nuclear power plant maintenance.

EPRI

EPRI – the Electrical Power Research Institute – is a non-profit making and independent organisation for research in the area of electricity production and the protection of the environment. It was established in 1973 in support of the development of the electrical industry. The Institute currently covers all aspects of production, transmission and use of electricity.

NRC

The NRC (Nuclear Regulatory Commission) is an independent agency in the USA in charge of safety and protection of the population against the effects of radiation from nuclear material, reactors and facilities for processing nuclear material. Together with the Slovenian Nuclear Safety Administration (URSJV) and the Jožef Stefan Institute (IJS), NEK is a member of a number of programmes which give access to information and literature on various relevant fields. ●

PWROG

PWROG (Pressurized Water Reactor Owners Group) is the association of all the pressurized water reactor operators and offers various programmes related to improved equipment, analyses by contemporary programmes and analytical methods, increased power of the plant, reduced number of unplanned shutdowns, simplification of the plant systems, the manufacture and use of nuclear fuel, optimisation of technical specifications, etc. ●



NEK activities in 2008

The President of the NEK Management Board chairs the Governing Board of the WANO Paris Centre, made up of representatives of all member countries of the Centre. We have had a representative in the WANO Paris Centre since 2004, holding the function of WANO Peer Review Programme Manager.

NEK has had an active part in WANO and INPO for several years. We have had three missions of WANO Peer Review so far, while our representatives took part in 27 such missions world-wide. Within the framework of Technical Assistance Missions, NEK received 25 such missions covering all activities of the plant. Our representatives regularly take part in specialist training programmes organised by these organisations.

As part of the cooperation with WANO we received in December the WANO Peer Review follow-up mission, who checked our fulfilments of 2007 suggestions. ●





Due to excellent results, our plant has become a model plant for other nuclear facilities and a source of good experience in different fields of work. In line with this and within the WANO organisation, NEK was visited by German plant representatives of Gundremmingen on the subject of production, by Slovak power plants Bohunice and Mochovce on the subject of nuclear safety assessment, and by Brazilian plant Angra on the subject of fire protection. Our representatives visited American electrical company Exelon and TVA as well as the McGuire power plant and made themselves familiar with their experience in the field of quality assurance, quality control and receiving inspection. They also visited the French Dampierre plant on the subject of the human factor in production.

NEK representatives also took an active part in international WANO Peer Review missions at the following facilities: Hunterston B, Great Britain, on the subject of operating experience transfer, and Almaraz, Spain, on the subject of chemistry. ●



Within Technical Assistance Missions our representatives took part in the mission related to fire protection (Dungeness B, Great Britain), while we received a mission of highly experienced specialists from the USA, Spain and Switzerland concerning radiological protection. The objective of the mission was to review the practices of radiological protection and suggest improvements. Based on the observation of activities, discussions and the knowledge from other areas, the mission members suggested certain changes. Their ideas were used as a basis for process improvement, which was confirmed also by the expert group of WANO at their Peer Review Follow-up mission.

As part of our cooperation with MAAE, we have organised three OSART and some other missions. Their inspectors, who safeguard nuclear fuel, are our regular visitors. ●



NEK takes an active part in some major areas of the EPRI Institute, including:

- equipment maintenance in nuclear power plants (NMAC – Nuclear Maintenance Application Centre),
- improvement, procurement and qualification of equipment (PSE – Plant Support Engineering),
- non-destructive tests and research (NDE – Non-Destructive Examination),
- exchange of experience in application of programmes for accident analysis (MAAP – Modular Accident Analyses Program User Group).

Our plant participated in the PWROG annual conferences, which are specially organised for nuclear power plants in European countries. ●

As in every year so far, NEK took an active part in various meetings and workshops organised by NUMEX; we exchanged data for comparison analyses and exchanged work experience. These included: meeting by maintenance management staff on the subject of spare part procurement, workshop on the subject of electrical equipment condition and main electric generator maintenance, workshop on the subject of maintenance staff training and observation of maintenance staff by the management, etc.

In October, NEK organised the annual conference of experts in reactor engineering of European nuclear facilities called TUG (Technology Users Group). The focal topic of the meeting was reactor core operation with the emphasis on the fuel integrity and inspection. The exchange of experience and the cooperation of European nuclear reactor operators have had an important impact on unification of work practices. The standardization of work standards and improvement methods make an efficient contribution to a safe and reliable operation of the reactor core and nuclear fuel in NEK. ●



Active professional training was carried out to ensure that training programmes were well prepared and executed, thus contributing to a high degree of personnel expertise, subsequently resulting in a higher level of safety and reliability of the power plant operation.



These programmes were largely prepared and executed in-house and partly in collaboration with external institutions, both national and foreign.

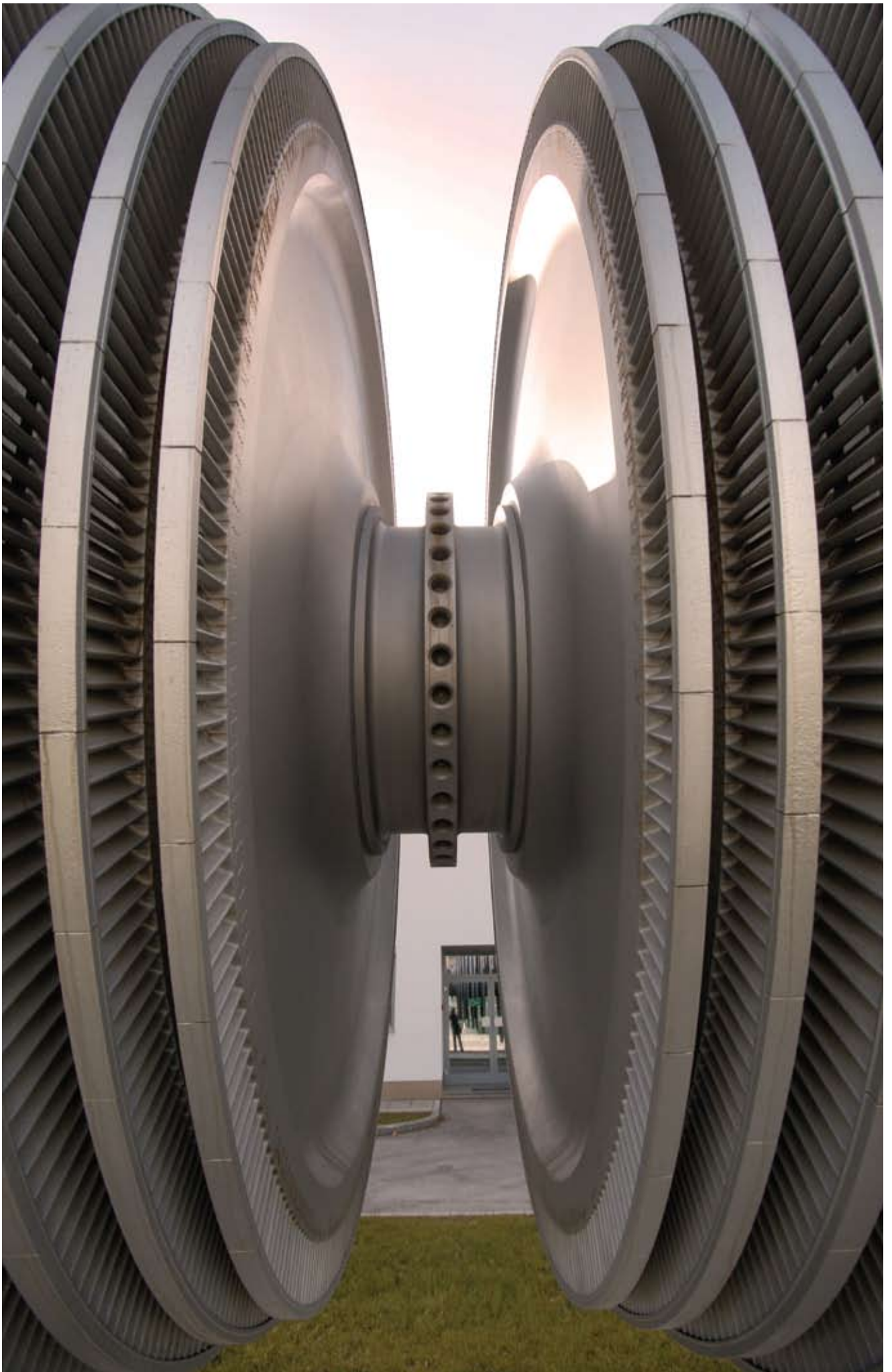
The NEK personnel training programmes were prepared in accordance with approved programmes and the annual plan, defined on the basis of the needs established in collaboration with heads of individual organisational units.



Training of operating personnel

Professional training programmes for operating personnel were prepared in line with relevant legal regulations, internal procedures and the two-year plan. The initial training of licensed operators continued according to the programme; this included the completion of systems and plant operation training. This is to be followed by training on the simulator and by on-the-job training in the control room. The initial training programme was successfully completed with the mock exam and final in-house exam. Seven staff who had been on training, were successful at the exams run by a URSJV expert commission. In November, the training of the second generation of operators was started.







Continuous professional training of licensed personnel was conducted in accordance with the approved outline programme, the relevant legislation and NEK in-house procedures. The annual training was executed in four weekly sessions. It was attended by all operating crews and other licensed personnel. The training was conducted through classes and full-scope simulator scenarios. In the final annual session, sixteen candidates successfully passed exams for licence renewal, of which three were for reactor operator, five for senior reactor operator and eight for shift engineer. One candidate successfully passed the exams for the first award of senior reactor operator. The exams, involving written, practical and oral parts, were carried out by a panel of assessors, consisting of the official examination board members with URSJV, the Production Management Department and the Professional Training instructors. ●

The ongoing professional training for local equipment operators proceeded in parallel with the training for licensed personnel in four weekly training sessions. The programme focused on hands-on training by using system operation procedures and other material which facilitate the refreshing and upgrading of knowledge and skills needed by local equipment operators in their work. Part of the training was carried out together with licensed personnel. We continued with practical training which took place in the technological facility or in the classroom which was actively linked with the full-scope simulator. ●



The operating personnel also attended practical training in three groups, including training for the personnel in charge of refuelling which was aimed at preparing all participants for safe and first-class performance of this important activity.

In addition to the number of changes, preparations for the major PDEH (Programmable Digital Electro-Hydraulic) Turbine Control System modification took place on the full-scope simulator. ●



Training for personnel in maintenance and other support functions

The professional training of technical personnel includes courses whose aim is for candidates to acquire or refresh the legally required general and specialist skills needed for performing maintenance and supporting functions. Within the framework of initial training for technical personnel, there were two courses in the fundamentals of nuclear power plant technology (OTJE). In line with regular practice, these two courses were conducted in collaboration with the Training Centre for Nuclear Technology of IJS. The IJS courses were conducted in two parts - in the initial four weeks theoretical fundamentals were covered, while the following four weeks were on systems and operations of the power plant. A total of 28 NEK staff attended the training. ●





Training of maintenance personnel continued with the programmes of specialist and legally required training, which were prepared on the basis of matrices of required qualifications. Some courses were conducted in cooperation with external institutions and partly in the Maintenance Personnel Training Centre in NEK. Some practical training was also implemented during preventive maintenance of equipment. The training continued with preliminary training programmes which were followed by specialist sessions conducted both by professional training staff and engineers and technical staff of individual maintenance departments. ●

Within the framework of permanent maintenance staff training in 2008, the training included two refresher courses on general and legal requirements. The staff were updated on power plant processes and systems, and operating experience. Part of the training was covered by professional issues.

The process of technical documentation development was resumed and the simulation facility in NEK's Maintenance Personnel Training Centre was intensively employed. ●



Other legally prescribed and general training

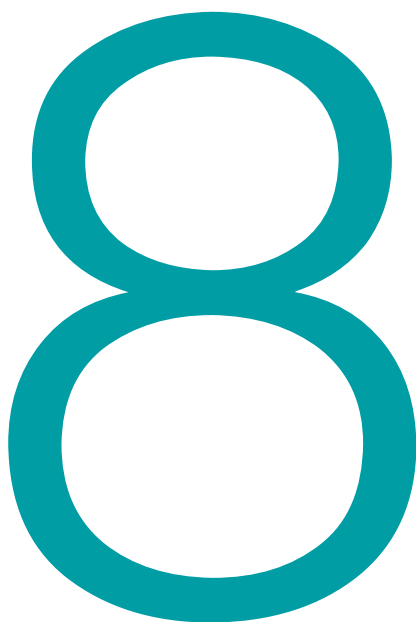
The implementation of established programmes of initial and refresher courses related to legally prescribed skills, such as safety and health at work, fire protection, hazardous substances, emergency planning, etc. were continued. The initial and refresher training in radiation protection was continued according to legal requirements.

At the end of the year an extensive drill related to NEK's organisational measures required in case of an emergency event was carried out by using the full-scope simulator. ●

In addition, other courses were carried out for other departments within the power plant, intended to update the staff on new legislation, introduce innovations in the area of production processes, and continued with general courses in the areas of computer literacy and foreign languages. ●



summary of the 2008 financial report



In accordance with the Companies Act (ZGD-1) and the Articles of Association of NEK, a summary of the Financial Report, which is part of the Annual Report of NEK for 2008, is given below.



The summary includes the main characteristics of business operations in 2008 and consolidated fundamental financial statements. The full versions of fundamental financial statements are presented in the NEK Annual Report for 2008 prepared in accordance with the Agreement concluded between the Government of the Republic of Slovenia and the Government of the Republic of Croatia on regulating the status and other legal issues related to investments in Krško Nuclear Power Plant, its utilisation and decommissioning (Intergovernmental Agreement), the Articles of Association of NEK, the Companies Act (ZGD-1) and Slovenian Accounting Standards (SAS).

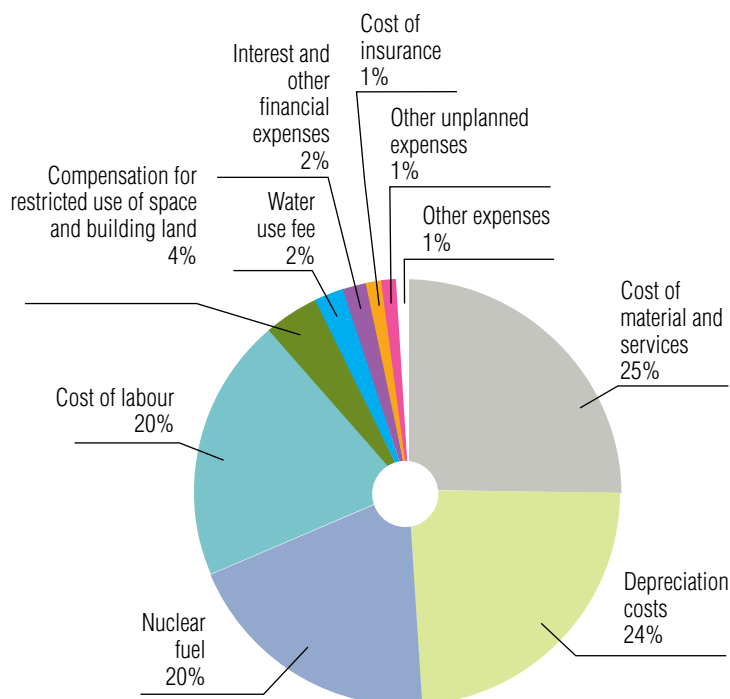
The Annual Report of NEK for 2008 was submitted to the organisation authorised to process and publish the data the day after it had been accepted at NEK's General Meeting, and is published on its website.

In 2008 the plant performed successfully and all economic objectives set in the business plan were achieved. Our two partners were supplied with 5,972 GWh of electricity, which is 82 GWh more than planned, at a competitive price which was slightly lower than the budget price.

The revenue amounted to a total of €141,346 thousand. The majority of this revenue was from electricity supplied to the partners, while the minor amount of the operating revenue was from auxiliary activities and the sale of unserviceable assets of NEK. In addition, unplanned financial revenue was generated from the interest on deposits made to banks and the revaluation of receivables and debts to preserve their value.

Expenses in 2008 amounted to €141,346 thousand. Their structure is illustrated in the graph below.





In accordance with the Articles of Association of NEK, the revenue and expenses in the amount of €1,926 thousand equated in 2008.

Long-term debts were additionally reduced as planned. The value of inventories is lower than planned.

Investments were realised with an index of 93 compared to the plan, as due to a faster rate of investment in 2007, the available depreciation funds for 2008 were reduced. Therefore, the investments were in practice realised at the level of available depreciation funds. ●

One of the important financial functions is undoubtedly the insurance of business activities against various kinds of financial risk. In 2008, taking into account the growth trend of the reference interest rate, the variable interest rate of long-term loans was fixed with an interest rate swap instrument. An amount of €293 thousand was saved due to secured interest rate. Consequently, the long-term loan interest, as a secured business category, was reduced by the same amount.

The financial position of NEK is satisfactory. Long-term resources cover all long-term assets and also the majority of inventories. Business results are demonstrated in the consolidated fundamental financial statements. These statements should be read together with the clarifications, which are, as mentioned, given in detail in the Annual Report of NEK for 2008. ●



Auditor's Report for Public Reporting Purposes

We have audited the financial statements of the company Nuklearna elektrarna Krško d.o.o. and the related notes for the financial year ended 31 December 2008, in accordance with International Standards on Auditing, on which the summaries of financial statements are based. In our report dated 31 March 2009, we have issued the opinion that the financial statements and the related notes on which the summaries of financial statements are based, give a true and fair view of the financial position of the Company as of 31 December 2008, the results of its operations, its cash flows for the year then ended in conformity with the International Contract entered into between the Republic of Croatia and the Republic of Slovenia, and in conformity with Slovenian Accounting Standards issued by Slovenian Institute of Auditors.

In our opinion, the attached summaries of the financial statements comply, in all material aspects, with the financial statements from which they originate.

For a better understanding of the financial situation of the Company as of 31 December 2008, the results of its operations, its cash flows for the year then ended, and the scope of our audit, it is necessary to read the summaries of the financial statements together with the financial statements from which they originate and with our Auditor's Report on these financial statements.

Borut Šterbenc, B.Sc.Ec.
Certified Auditor

KPMG SLOVENIJA,
podjetje za revidiranje, d.o.o.

Marjan Mahnič, B.Sc.Ec.
Certified Auditor
Partner

KPMG Slovenija, d.o.o.
1

Ljubljana, 31 March 2009

Financial statements

balance sheet as at 31 december 2008

in thousand EUR

Balance sheet

31/12/2008 31/12/2007

ASSETS

A. LONG-TERM ASSETS	424,924	437,048
Tangible fixed assets	423,679	435,284
Investment property	669	714
Long-term financial investments	576	737
Long-term operating receivables	-	313
B. CURRENT ASSETS	92,659	86,257
Inventories	78,437	65,803
Short-term financial investments	1,427	4,192
Short-term operating receivables	12,785	16,240
Cash	10	22
C. SHORT-TERM DEFERRED EXPENSES AND ACCRUED REVENUE	235	250
TOTAL ASSETS	517,818	523,555
Off-balance sheet assets	9,002	9,880

EQUITY AND LIABILITIES

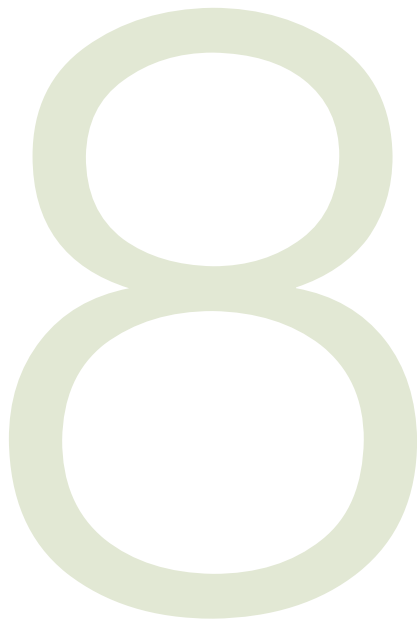
A. EQUITY	439,515	439,515
Called-up capital	353,545	353,545
Revenue reserves	88,675	88,675
Retained earnings	(2,705)	(2,772)
Net profit or loss for the financial year	0	67
B. PROVISIONS AND LONG-TERM ACCRUED COSTS AND DEFERRED REVENUE	4,404	4,577
Provisions for jubilee benefits and termination benefits	3,498	3,629
Other provisions	906	948
C. LONG-TERM LIABILITIES	39,893	46,568
Long-term financial liabilities to banks	39,568	46,215
Long-term operating liabilities	325	353
Č. SHORT-TERM LIABILITIES	33,802	32,635
Short-term financial liabilities to banks	6,647	6,647
Short-term operating liabilities	27,155	25,988
D. SHORT-TERM ACCRUED COSTS AND DEFERRED REVENUE	204	260
TOTAL EQUITY AND LIABILITIES	517,818	523,555
Off-balance sheet liabilities	9,002	9,880

income
statement
for the year
ended
31 december 2008

INCOME STATEMENT	in thousand EUR	
	2008	2007
I. OPERATING REVENUE	140,554	129,120
II. OPERATING EXPENSES	138,791	126,464
III. OPERATING PROFIT OR LOSS FROM OPERATIONS (I – II)	1,763	2,656
IV. FINANCIAL REVENUE	792	514
V. FINANCIAL EXPENSES	2,555	3,103
VI. OPERATING PROFIT OR LOSS FROM FINANCING (IV – V)	(1,763)	(2,589)
VII. OPERATING PROFIT OR LOSS FOR THE PERIOD (III + VI)	0	67
VIII. CORPORATE INCOME TAX	-	-
IX. NET OPERATING PROFIT OR LOSS FOR THE PERIOD (VII – VIII)	0	67

cash flow
statement for the
year ended
31 december 2008

CASH FLOW STATEMENT	in thousand EUR	
	2008	2007
I. CASH FLOWS FROM OPERATING ACTIVITIES		
1. Cash receipts from operating activities	158,069	148,920
2. Cash disbursements from operating activities	127,419	130,704
3. Net cash from operating activities (1 – 2)	30,650	18,216
II. CASH FLOWS FROM INVESTING ACTIVITIES		
1. Cash receipts from investing activities	3,125	21,959
2. Cash disbursements from investing activities	24,565	30,792
3. Net cash from investing activities (1 – 2)	(21,440)	(8,833)
III. CASH FLOW FROM FINANCING ACTIVITIES		
1. Cash receipts from financing activities	23,830	40,399
2. Cash disbursements from financing activities	33,052	49,790
3. Net cash from financing activities (1 – 2)	(9,222)	(9,391)
IV. CLOSING BALANCE OF CASH (VI + V)	10	22
V. Net cash inflow or outflow for the period	(12)	(8)
+		
VI. Opening balance of cash	22	30



equity components	in thousand EUR					
	called-up capital	legal reserves	statutory reserves	retained net profit	retained earnings	net profit or loss for the financial year
	called-up capital	legal reserves	statutory reserves	retained net profit	retained net loss	net profit
OPENING BALANCE - 1/1/2008	353,545	35,354	53,321	-	(2,705)	-
Movements to equity	-	-	-	-	-	-
Movements within equity	-	-	-	-	-	-
Allocation of net profits based on the resolution of the management and the supervisory board	-	-	-	-	-	-
CLOSING BALANCE - 31/12/2008	353,545	35,354	53,321	-	(2,705)	-
OPENING BALANCE - 1/1/2007	353,545	35,354	53,321	260	(3,032)	-
Movements to equity	-	-	-	-	-	67
Net profit or loss for the financial year	-	-	-	-	-	67
Movements within equity	-	-	-	(260)	260	-
Allocation of net profits based on the resolution of the management and the supervisory board	-	-	-	(260)	260	-
CLOSING BALANCE - 31/12/2007	353,545	35,354	53,321	0	(2,772)	67
						439,515





In accordance with the Agreement concluded between the Government of the Republic of Slovenia and the Government of the Republic of Croatia on regulating the status and other legal issues related to investments in the Krško Nuclear Power Plant, its utilisation and decommissioning, and the Articles of Association, both having entered into force on 11th March 2003, NEK is organised as a limited liability company. The bodies of the company, having parity membership, are the General Assembly, the Supervisory Board and the Management Board.



The equity capital of NEK is divided into two equal business shares owned by the members *GEN energija, d. o. o., Krško* and *Hrvatska elektroprivreda d.d., Zagreb*. NEK generates for and supplies electricity exclusively to the members; it is their right and obligation to take 50 percent of the total available capacity and net electric power.

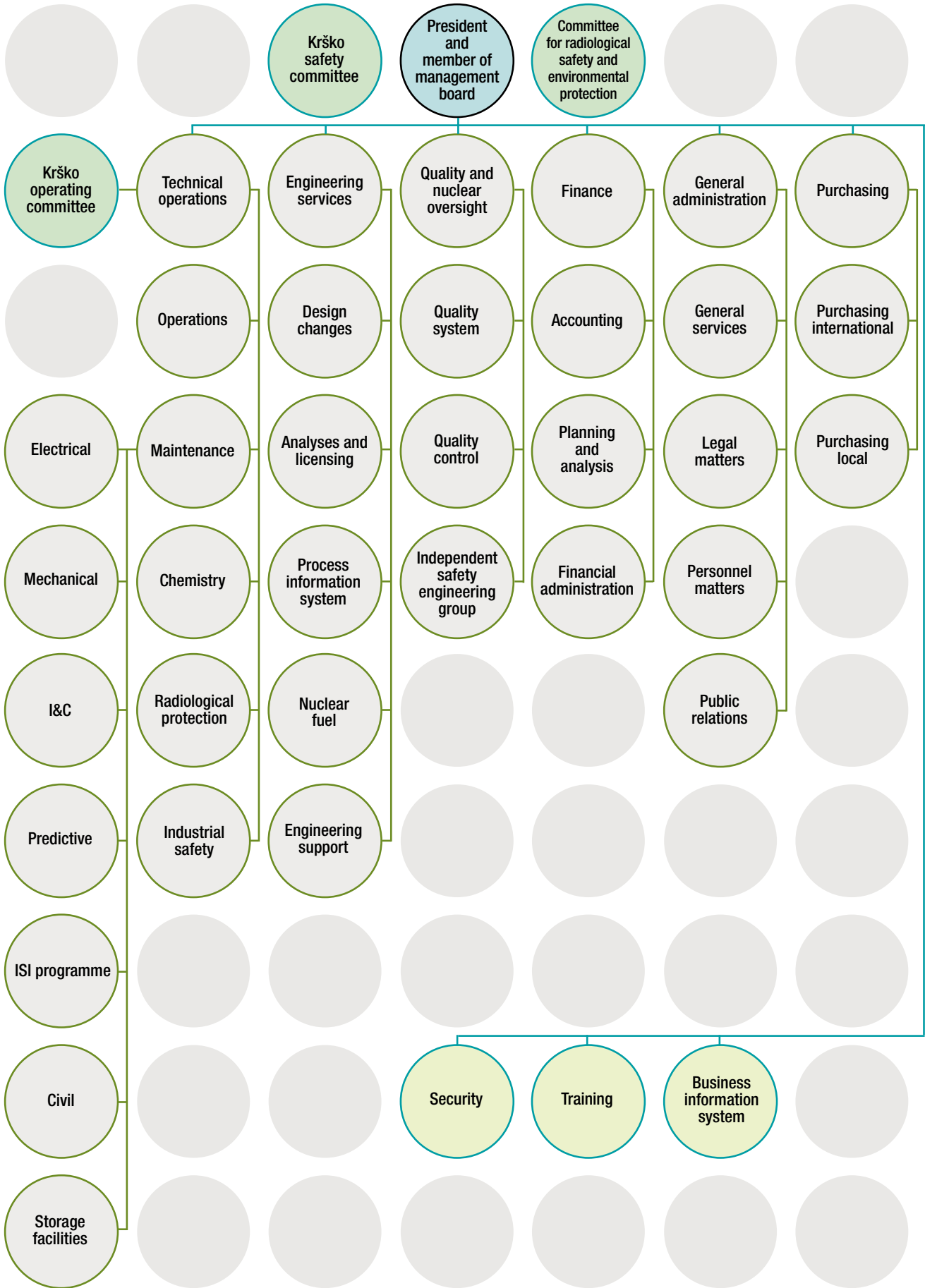
The NEK organisational structure reflects contemporary organisational standards of nuclear facility operators. Special attention is paid to the strengthening of vital functions of the organisation and to enhanced quality and efficiency of employees. ●

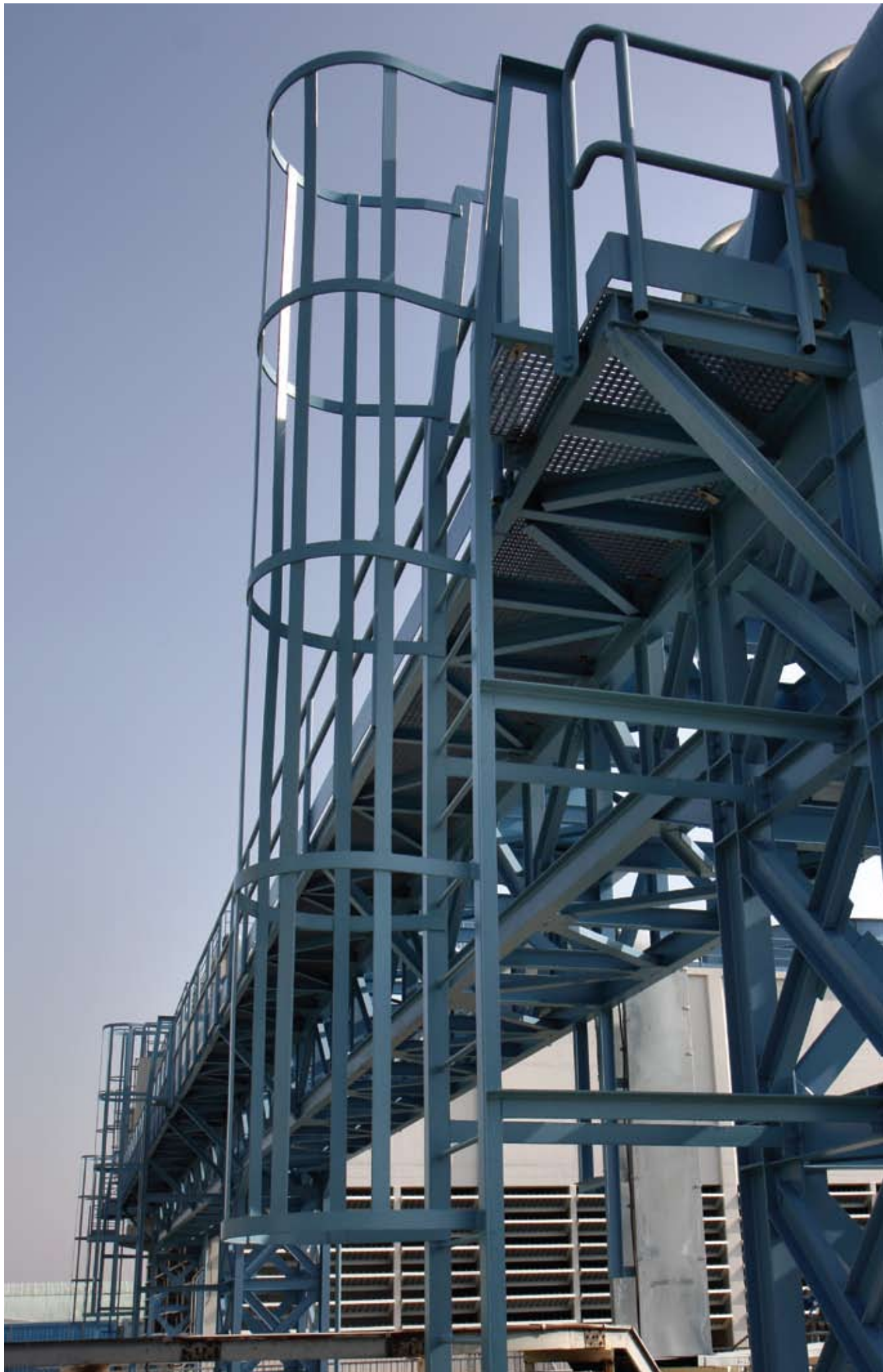
NEK's strength is in a high organisational standard and stability of human resources coupled with a good educational structure. At the end of 2008 there were 588 employees, of which 45 percent had higher, high or university education. The process of generation change is still continuing, through the process of staff retirement by those who are now leaving after being employed since the plant construction or at the start of plant operation. The annual exit turnover is between four and five percent. The newly recruited staff are being introduced through training and the programmed process of knowledge and experience transfer in technological processes. Personal development is made available to employees via training at home and abroad. ●





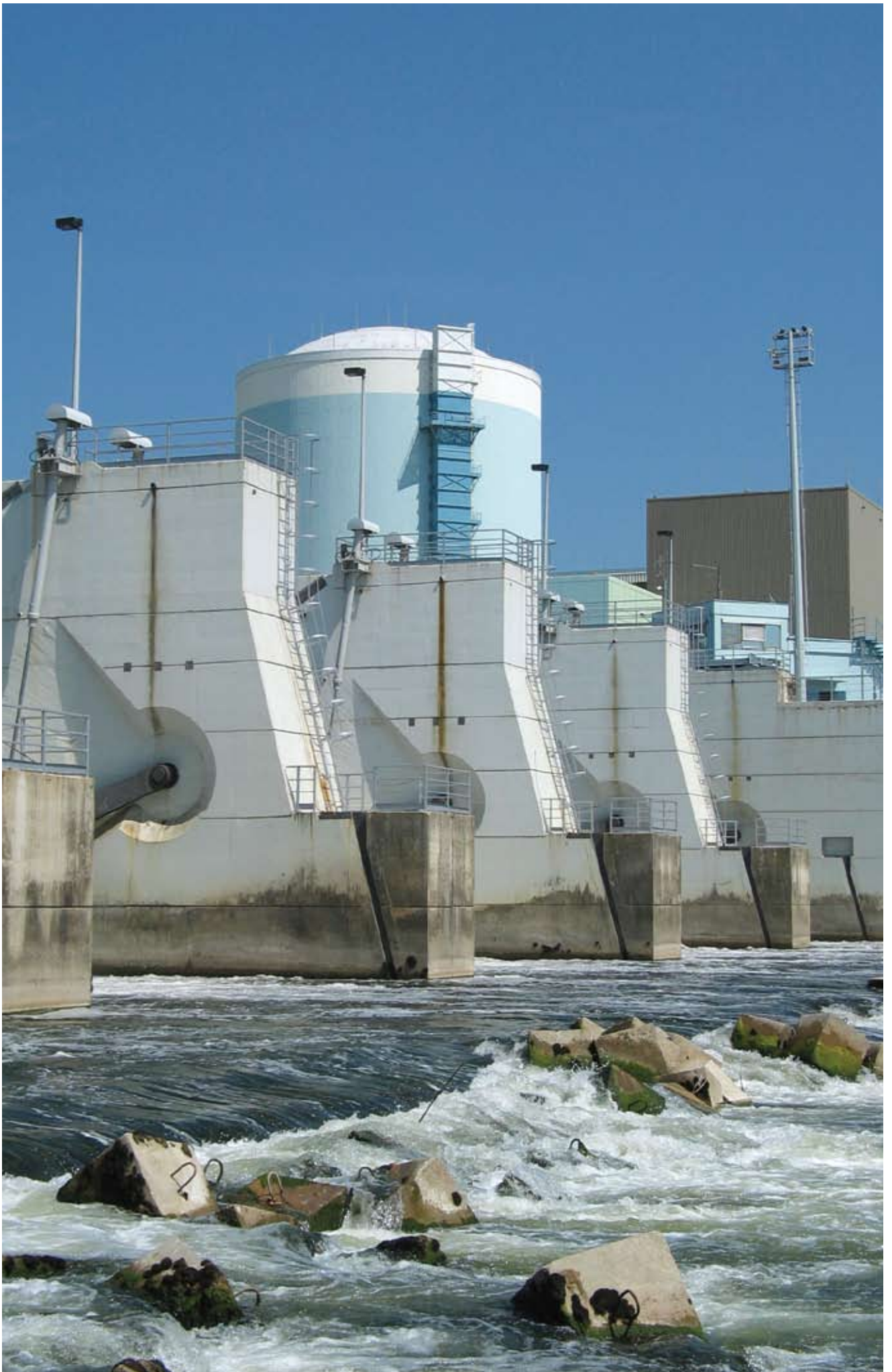
organigram







CT	Cooling Tower
ČD	Čisti dobiček / <i>Net Profit</i> /
DCM	Document Control Module
EPRI	Electrical Power Research Institute
FRI	Fuel Reliability Indicator
IAEA	International Atomic Energy Agency (MAAE)
IJS	Institut Jožef Stefan / <i>Jožef Stefan Institute</i> /
INES	The International Nuclear Event Scale
INPO	Institute for Nuclear Power Operations
I&C	Instrumentation and Control
ISI	In-Service Inspection
ISO	International Organisation for Standardization
MAAP	Modular Accident Analyses Program User Group
MAAE	Mednarodna agencija za atomsko energijo /IAEA - <i>International Atomic Energy Agency</i> /
MECL	Master Equipment Component List
MIS	Poslovno informacijski system / <i>Management Information System</i> /
NEK	Nuklearna elektrarna Krško / <i>Krško Nuclear Power Plant</i> /
NMAC	Nuclear Maintenance Applications Centre
NDE	Non-Destructive Examination
NRC	Nuclear Regulatory Commission
NUMEX	Nuclear Maintenance Experience Exchange
NUOG	Nuclear Utility Obsolescence Group
OSART	Operational Safety And Review Team
OTJE	Osnove tehnologije jedrskih elektrarn /Fundamentals of Nuclear Power Plant Technology/
PDEH	Programmable Digital Electro-Hydraulic
PSE	Plant Support Engineering
PWROG	Pressurized Water Reactor Owners Group
SRS	Slovenski računovodski standardi /Slovenian Accounting Standards/
SSC	Sistemi, strukture in komponente /Systems, Structures and Components/
TUG	Technology Users Group
URSJV	Uprava Republike Slovenije za jedrsko varnost /Slovenian Nuclear Safety Administration/
WANO	World Association of Nuclear Operators
ZGD	Zakon o gospodarskih družbah / <i>Companies Act</i> /





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ISSN 1854-5688

