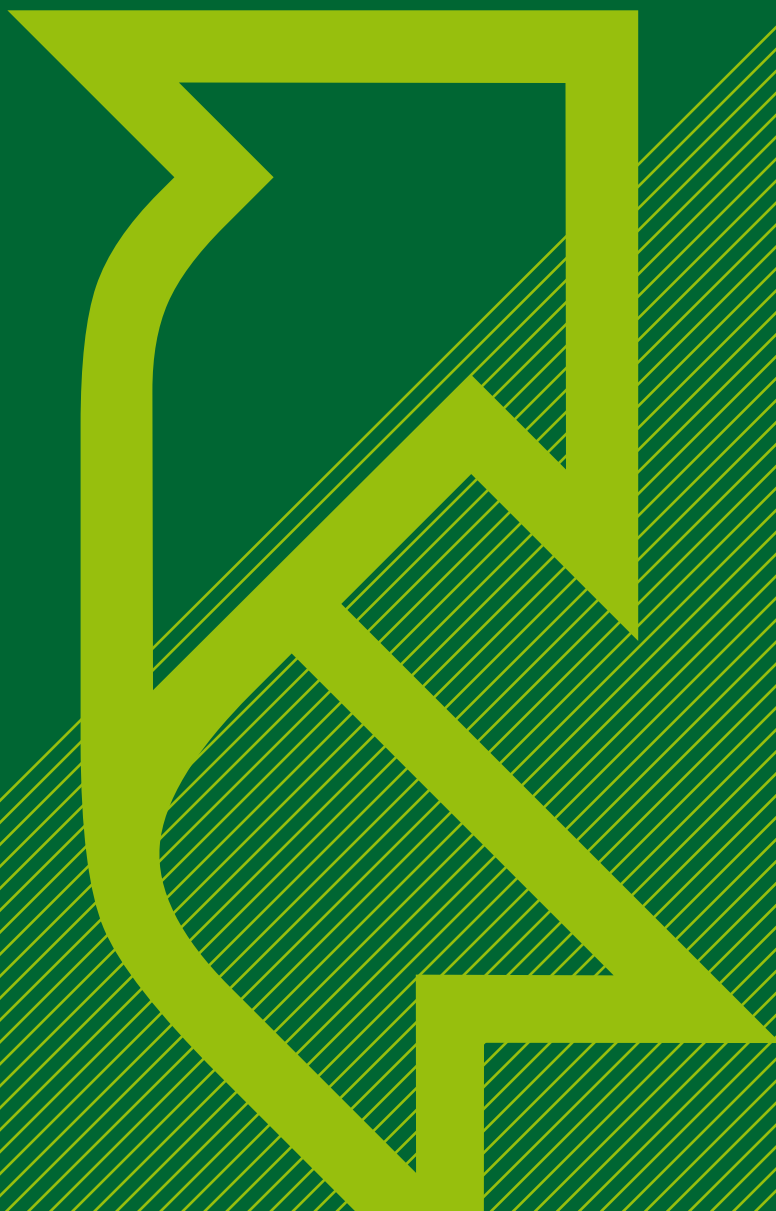


ELECTRIC POWER INDUSTRY OF SERBIA

ENVIRONMENT PROTECTION



ENVIRONMENT **PROTECTION**

THE MISSION

OF THE ELECTRIC POWER INDUSTRY OF SERBIA IS SECURE ELECTRICITY SUPPLY TO ALL CUSTOMERS, UNDER THE MOST FAVORABLE MARKET CONDITIONS, WITH CONTINUOUS UPGRADING OF THE SERVICES, IMPROVEMENT OF ENVIRONMENTAL PROTECTION AND WELFARE OF THE COMMUNITY

THE VISION

OF THE ELECTRIC POWER INDUSTRY OF SERBIA IS TO BE A SOCIALLY ACCOUNTABLE, MARKET-ORIENTED AND PROFITABLE COMPANY, COMPETITIVE ON THE EUROPEAN MARKET WITH A MAJOR IMPACT IN THE REGION, RECOGNIZED AS A RELIABLE PARTNER AMONG THE LOCAL AND INTERNATIONAL COMPANIES



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Introduction



LACK OF AWARENESS ABOUT ENVIRONMENTAL PROTECTION IMPORTANCE, IRRESPONSIBLE BEHAVIOUR TOWARDS NATURAL RECOURCES, LACK OF FUNDING, AS WELL AS GENERAL SOCIAL CLIMATE IN THE LAST DECADE OF THE 20th CENTURY, HAVE CAUSED GENERAL WATER RESOURCES, AIR AND SOIL DEVASTATION. DUE TO THESE REASONS, PUBLIC ENTERPRISE ELECTRIC POWER INDUSTRY OF SERBIA HAS MET THE BEGINNING OF 21st CENTURY, IN THE FIELD OF ENVIRONMENTAL PROTECTION, WITH DELAY OF 30-40 YEARS, COMPARED TO THE DEVELOPED COUNTRIES OF THE EUROPEAN UNION. INTERNATIONAL POLICY, BOTH GENERAL AND ENERGY, WAS SEEKING FOR THE SOLUTION OF GREAT, PLANETARY PROBLEMS IN THE FIELD OF ENVIRONMENTAL PROTECTION, AND CLIMATE CHANGE REDUCTION CAUSED BY INTENSIVE INDUSTRIAL DEVELOPMENT. THE WORLD STARTED TO LOOK FOR NEW ENERGY SOURCES IN ORDER TO COVER INCREASING CONSUMPTION, REDUCE UNCONTROLLED FOSSIL FUEL UTILIZATION AND INCREASE ENERGY EFFICIENCY OF GENERATION CAPACITIES USING THESE VERY FUELS. ENERGY SECTOR AND ENVIRONMENTAL PROTECTION, CONSIDERING THAT THEY ARE IN CAUSE-AND-EFFECT RELATION, TOGETHER WITH THE ECONOMY AND THE SOCIAL COMPONENT, HAVE ESTABLISHED THE NEW PHILOSOPHY OF MODERN CIVILIZATION, COVERED BY THE TERM "SUSTAINABLE DEVELOPMENT".

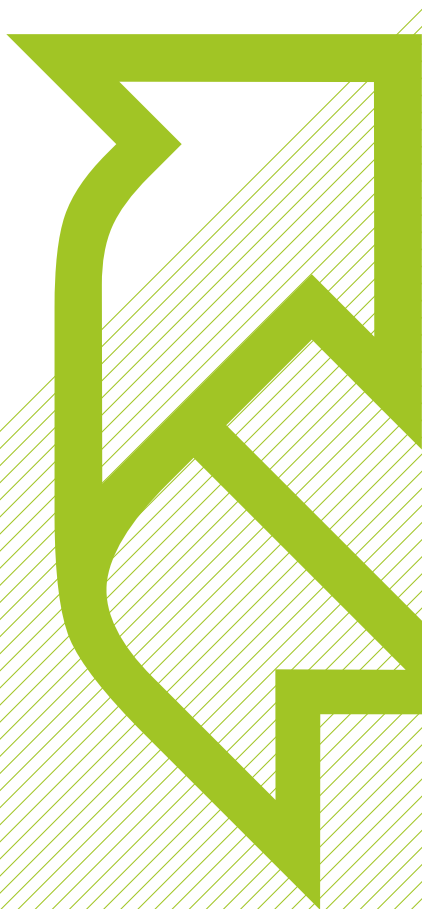
After 2000, Electric Power Industry of Serbia initiated revitalization and modernization of its generation capacities. Large power plant rehabilitation projects financed and supported by international community (European Union and some other countries) as well as through own funds included environmental protection improvement projects. They have become an integral part of development projects of EPS capacities, while settlement of environmental protection problems was granted the same priority as electricity generation.

Environmental protection represents the part of mission and vision of EPS and its business policy. According to the scope and complexity of projects, amount of the invested funds for their realization, as well as achieved effects, it may be said that EPS has become a leader in the field of environmental protection in Serbia and the surrounding countries.

Almost one third of obligations which Serbia needs to fulfil within its state EU integration policy are related to environmental standards and regulations. Under the Contract on the Founding of SE Europe Energy Community, signed and ratified by our country in 2005, energy facilities in Serbia, together with EPS facilities, are under obligation to fully observe *Acquis Communautaire* ('legal legacy of the European Union', i.e. a group of principles and regulations, emerging from general legal EU orientations) by 2017. Electric Power Industry of Serbia made the decision to respect all standards emerging from *Acquis Communautaire*, concerning environmental protection.

Fulfilment of Kyoto Protocol obligations and application of its GHG emission reduction mechanisms is especially requested today. Clean Development Mechanism – CDM means that industrial developed countries, which initiated environmental pollution, should provide financial support for application of this mechanism within developing countries. EPS is currently analyzing the possibilities for CDM application in projects to be implemented with the strategic partner (TPP Nikola Tesla B3, TPP Kolubara B and CHP Novi Sad). Depending on the results of the above analysis, EPS will decide in which way it will continue with its activities in terms of CDM application. Consequently, under HPP Zrnovnik reconstruction and modernisation project, feasibility study is under development, by which the question of CDM application to this project will be examined.

Harmonization of domestic with the European legislation in the field of environmental protection has been initiated in 2001 in Serbia, with the first phase finalised in 2004 with adoption of the set of environmental laws. Considering that thermal power sector of Electric Power Industry of Serbia is subject to these laws, after 2015, its facilities will need to have an integrated operation licence. A set of 16 new laws has recently been adopted



in Serbia, harmonized with international regulations in the field of environmental protection.

For implementation of all programs related to the settlement of environmental issues (in the period between 2005 and 2015) as well as for harmonization of EPS business operations with EU standards, annual investments of EUR 120 million are necessary i.e. EUR 1.2 billion for the entire period. Allocation of funds is directly conditioned by electricity price, which at the moment is the lowest in Europe. That is why Electric Power Industry of Serbia needs to have a more realistic price of goods it is selling, at least close to the market level prices. Until now, EPS has implemented several projects in the field of environmental protection through own funds, obtained from the electricity sale. The most expensive environmental protection projects within EPS are about to come.

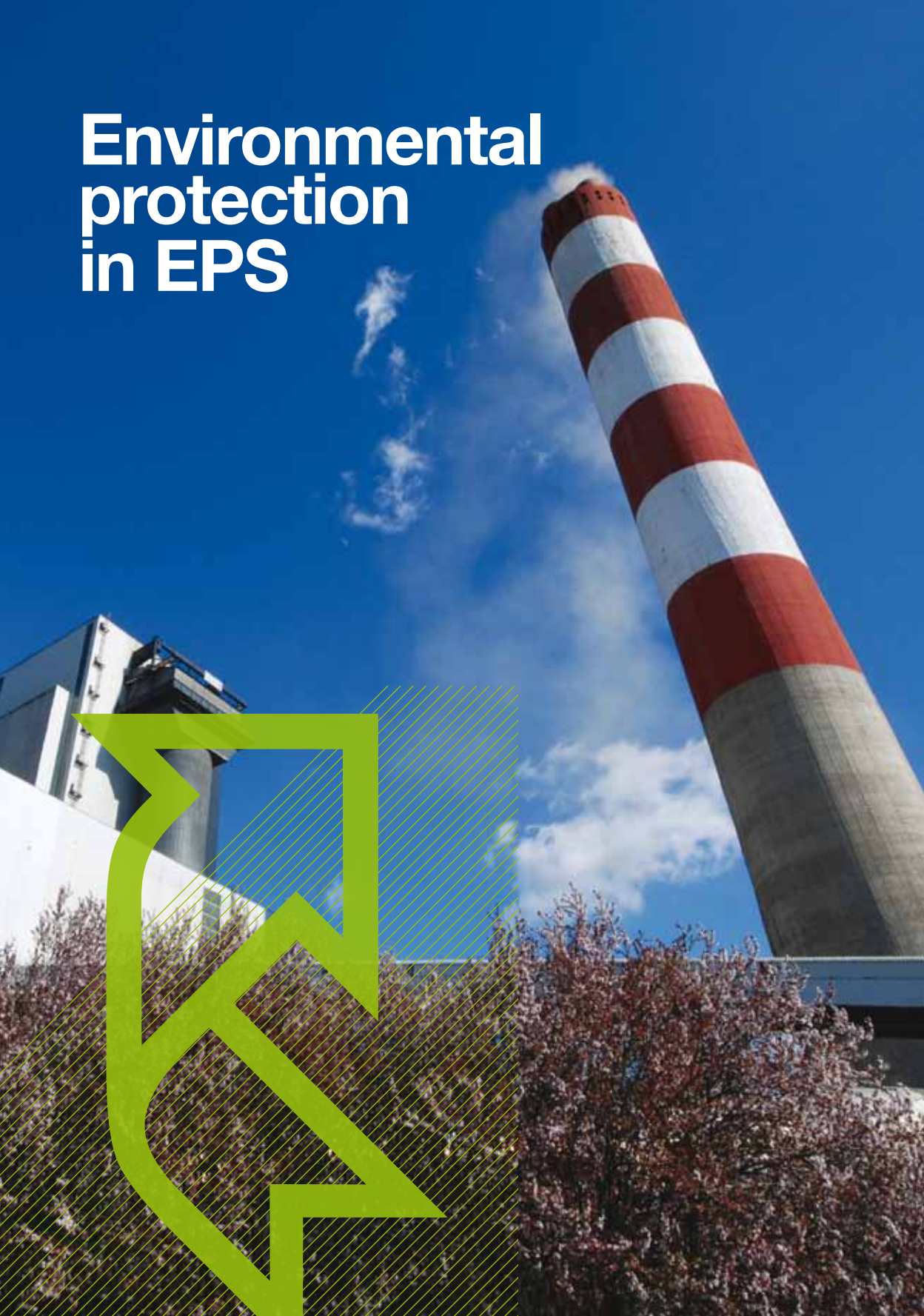
By investing into the environmental protection projects in the past few years, the state of the environment has significantly been improved. Production results, reliability, and readiness of units, indicate that funds invested into development projects, as well as environmental protection projects, were directed well and appropriately used.

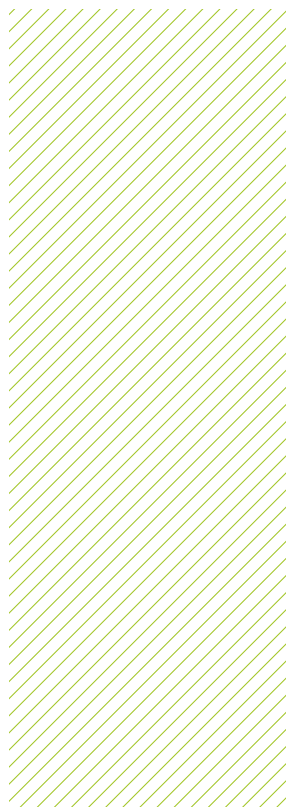
In addition to this, Electric Power Industry of Serbia, as a socially responsible company also has to implement a series of other tasks, such as: identification of environmental responsibilities both at the corporate level and at the level of its corporate enterprises, establishment of an integral pollution control system development of the polluter cadastre at the corporate level, introduction of organizational structures for environmental monitoring and standardisation of control and measurement equipment...

In 2009, Electric Power Industry of Serbia is half way through the implementation of planned environmental projects - considering that beginning of environmental modernization started in 2003, and that development strategy is planned by 2015.



Environmental protection in EPS





THIS PUBLICATION SHOULD DEMONSTRATE WHAT EPS HAS BEEN DOING IN THE PREVIOUS SIX YEARS, AND WHICH BUSINESS VENTURES ARE ABOUT TO COME IN NEXT SIX YEARS. ENVIRONMENTAL ASPECTS ARE SPECIFIC FOR EACH SECTION OF ELECTRIC POWER INDUSTRY OF SERBIA. THESE ACTIVITIES COULD BE CLASSIFIED INTO FIVE SEGMENTS: THERMAL POWER SECTOR, OPEN CAST MINES, HYDROPOWER SECTOR, DISTRIBUTION ACTIVITY, AND AS A SEPARATE SECTION - WASTE MANAGEMENT.

A photograph of a thermal power plant with two tall smokestacks emitting white steam, set against a clear blue sky. In the foreground, there is a lush green cornfield with yellowing tassels. A large, stylized green graphic, resembling a stylized 'E' or a series of connected zig-zags, is overlaid on the right side of the image. The number '01' is written in a white outline font on the left side, positioned over the cornfield.

01

THERMAL POWER SECTOR



IT IS EVIDENT THAT THERMAL POWER PLANTS ARE THE HIGHEST MEASURABLE ENVIRONMENT POLLUTERS IN SERBIA - THEY EMIT 70% OF TOTAL CARBON DIOXIDE. ON THE OTHER HAND, THEY ARE THE BIGGEST ELECTRICITY PRODUCERS IN THE COUNTRY. THAT IS THE REASON WHY THE MAJORITY OF PREVIOUS, AS WELL AS FUTURE ENVIRONMENTAL PROJECTS ARE DIRECTED TO THIS SECTOR. THIS IMPLIES THAT THE HIGHEST FUNDS ARE INVESTED INTO THESE PROJECTS.

Every year EPS thermal power plants combust 30 million tons of lignite. Combustion product is approximately 5.5 million tons of ash and slag per year, disposed at open disposal sites with the total area of 1,200 hectares. Some 280,000 tons of sulphur-dioxide, followed by about 60,000 tons of nitrogen oxides and about 30 million tons of carbon-dioxide are emitted into the atmosphere every year.

The biggest environmental problems within thermal power sector are related to electrostatic precipitator operation (regulating pollution from flue gas dust), sulphur dioxide and nitrogen oxides emission from flue gases from thermal power plants, and ash impact on air, soil and ground water. Considering that the biggest thermal power plants of EPS are located in Obrenovac and Kostolac (CE TPP Nikola Tesla and CE TPPs & OCMs Kostolac), areas of these towns and especially their citizens are exposed to the highest pollution level.

AIR PROTECTION

Thermal power plants are the biggest air polluters; lignite combustion as the basic fuel leads to emission of solid ash particles, harmful gases emission (sulphur dioxide, nitrogen oxides, carbon dioxide) into the atmosphere and ash dispersion from disposal sites.



ELECTROSTATIC PRECIPITATOR OPERATION

In the beginning of 21st century almost all thermal power plants in Serbia emitted solid ash particles at the level ten times higher than permitted. Compared to the European standard of 50 mg/m³, electrostatic precipitators of individual (older) EPS generation units were in such state that dust concentration in flue gases ranged between 1,000 and 2,000 mg/m³. The fact that the share of TPP Nikola Tesla A2 and A1 units prior to ESP reconstruction was 66% in the total ash emission from TPP Nikola Tesla stacks and only 15% in the total electricity generation in this thermal power plant says enough about the state and age of these electrostatic precipitators.

Activities on operational improvement of electrostatic precipitators have been initiated in 2003, while harmonisation of electrostatic precipitator operation with requirements of EU regulations has been initiated from 2004. The first unit whose electrostatic precipitator operation was aligned with EU standards, was unit 5 at TPP Nikola Tesla A (2004). This is at the same time the first large environmental project in EPS executed under European Union standards.

The plan is to revitalise all electrostatic precipitators in thermal power plants by the end of 2011, and to have solid particles emission in accordance with EU regulations – 50 mg/m³.



FINALIZED ESP RECONSTRUCTION/MODERNIZATION PROJECTS AT EPS TPPs

Thermal power plant	Start of implementation	Funds in €	Source of financing
TPP Nikola Tesla A - unit A5	2004	3,700,000	EPS
TPP Nikola Tesla A - unit A2	2005	3,500,000	EPS - loan from Poland
TPP Nikola Tesla A - unit A1	2006	5,000,000	EPS and Environmental Protection Fund, Republic of Serbia
TPP Nikola Tesla A - unit A4	2007	6,000,000	EPS and Environmental Protection Fund, Republic of Serbia
TPP Kolubara A - unit A5	2008	5,100,000	EPS and Environmental Protection Fund, Republic of Serbia
TPP Kostolac A - unit A2	2006	5,400,000	EAR donation
TPP Kostolac A - unit A1	2005	2,500,000	EPS
TOTAL		31,200,000	

COMPARED TO 2003 EMISSION, AFTER ESP RECONSTRUCTION, AIR EMISSION OF SOLID PARTICLES THE AT TPP NIKOLA TESLA WAS REDUCED FOR ABOUT 88% AND AT TPP KOSTOLAC FOR ABOUT 54%, COMPARED TO STATE FROM 2004.

ESP PROJECTS IN PROGRESS / WHICH NEED TO BE IMPLEMENTED			
Project I	Reconstruction or replacement of existing electrostatic precipitators on TPPs units		
Thermal power plant	Start of implementation	Funds in €	Source of financing
TPP Nikola Tesla A - unit A6	2009/2009	6,000,000	IPA-2007
TPP Nikola Tesla B - unit B1	2009/2009	6,000,000	IPA-2007
TPP Nikola Tesla B - unit B2	2010/2010	7,500,000	IPA-2008/EPS
TPP Morava	2010/2010	4,000,000	EPS/IPA-2009 (expected)
TPP Kolubara A - unit A5	2008/2009	4,000,000	Environmental Protection Fund, Republic of Serbia/EPS
TPP Kostolac B - unit B1	2010	5,000,000	Environmental Protection Fund, Republic of Serbia/EPS
TPP Kostolac B - unit B2	2010	5,000,000	Environmental Protection Fund, Republic of Serbia/EPS
TPP Nikola Tesla A3* (2014; EUR 7,000,000)			
TOTAL		37,500,000	

SO FAR EUR 31.2 MILLION HAS BEEN INVESTED INTO THESE PROJECTS, WITH ADDITIONAL EUR 37.5 MILLION TO BE INVESTED BY THE END OF THE YEAR.

FLUE GAS TREATMENT

The second phase of air protection measures includes installation of flue gas treatment plants i.e. desulphurization and de-nitrification. This project, planned for implementation in the period 2010 - 2015 is significant from air protection aspect, as well as from the aspect of value of necessary funds. It is estimated that more than half billion euros will be necessary for the construction of these plants on EPS TPP units. Construction of desulphurization plants requires approximately EUR 10 million for 100 MW; therefore for example, the necessary amount for TPP Nikola Tesla would under such calculation amount to ca. EUR 300 million.

Sulphur and nitrogen oxides created during lignite combustion at thermal power plants, cause acid rains, adversely affecting people's health, flora and fauna, contaminating soil and water in the vicinity of power plants, damaging facades of civil structures, even destroying metal structures.

Emission limit value for sulphur dioxide is 400 mg/m³, while for example in 2003 at TPP Nikola Tesla this limit value was three



times higher than permitted. It should be noted however that measurements have indicated that although no sulphur-dioxide reduction measures have been undertaken on these thermal power plants, whereby its flue gas concentration is considerably higher than permitted values – concentration of this gas in the surrounding area of thermal power plants is not high thanks to high stacks.

There are several techniques for flue gas desulphurization in the world today, while the most common one is wet desulphurization process. Sulphur dioxide is separated from flue gas through the usage of pulverized lime suspension. Consequently, large gypsum amount is created as by-product of this technology. Gypsum produced in this manner is used in the construction industry. For example, in Poland the entire gypsum amount produced in these processes is marketed (installed capacity of its thermal power plants is about 5,000 MW).

Two units of TPP Kostolac B have the largest impact of sulphur-dioxide emission from thermal power plants of EPS (their share in the total emission of this gas is ca. 40% and in total electricity generation of EPS 16%).

Such high share in sulphur-dioxide emission lies in the fact that lignite from Kostolac Mining Basin contains the double amount of sulphur (1.3%) compared to Kolubara lignite (0.5%). For this reason, this procedure will first be applied on TPP Kostolac B units.

By applying the above-mentioned desulphurization technology, some 400,000 tons of gypsum would be produced annually, which should be offered to potential manufactures of gypsum products, not only in Serbia. Therefore, one of the main tasks is finding the strategic partner for takeover of about half million tons of gypsum per year. If this proves to be successful, it would be the best proof that waste can become a secondary raw material.

Emission limit value of nitrogen oxides is 450 mg/m^3 , and it was within legally prescribed boundaries in TPP Nikola Tesla in 2003. It was established that nitrogen oxides above permitted values is only emitted from units with the capacity higher than 300 MW. Emission reduction of this gas can be achieved by applying primary measures, i.e. through reconstruction of the boiler furnace. It was calculated that EUR 83.5 million need to be provided for finalization of this project. Harmful gases emission from CHPs (Corporate Enterprise Panonske CHPs), especially sulphur dioxide is prominent when mazout is used as energy source. When natural gas is used, sulphur dioxide emission is within permitted limit values.



FLUE GAS DESULPHURIZATION PROJECTS TO BE IMPLEMENTED			
Thermal power plant	Start of implementation /end of implementation	Funds in EUR	Source of financing
TPP Nikola Tesla A – A3–A6	2012/2016	200,000,000	Not defined
TPP Nikola Tesla B	2010/2014	210,000,000	Potentially IPA/EPS
TPP Kostolac B	2009/2011	125,000,000	Environmental Protection Fund, Republic of Serbia
TOTAL		535,000,000	

FLUE GAS DE-NITRIFICATION PROJECTS TO BE IMPLEMENTED			
Thermal power plant	Start of implementation /end of implementation	Funds in EUR	Source of financing
TPP Nikola Tesla A – unit A3-A6	2008 - 2015	24,000,000	IPA (expected)
TPP Nikola Tesla B – unit B1-B2		24,000,000	IPA (expected)
TPP Nikola Tesla B – unit B2		7,500,000	IPA (expected)
TPP Morava		4,000,000	EPS
TPP Kostolac A – unit A1-A2		12,000,000	EPS
TPP Kostolac B – unit B1-B2		12,000,000	Environmental Protection Fund, Republic of Serbia
TOTAL		83,500,000	

RECLAMATION OF ASH DISPOSAL SITES

Ash dispersion often occurs due to wind activity. It represents one of the most difficult consequences of power plant operation. Therefore, it is no wonder there are many efforts in finding solutions for air dispersion prevention, as well as ash disposal site impact on ground water and soil quality.

Reclamation of ash disposal sites is implemented in case of ash dispersion by wind as a protective measure. It includes their afforestation (planting of black pine, Siberian elm, acacia, linden) and grassing. In addition to this, sprinkling systems are installed for dam wetting and grass watering, together with canon systems for dry surface wetting within the flat areas of ash disposal sites. In order to return the degraded soil to its previous state, it is primarily necessary to perform technical (terrain levelling and backfilling) and afterwards biological reclamation (grassing and tree planting).

INTRODUCTION OF NEW ASH HANDLING TECHNOLOGY

Ash transport manner from the thermal power plant to the disposal site has great influence on air pollution and ground water contamination. Hydraulic transport technology is used in thermal power plants of EPS for ash and slag transport. It unfortunately does not provide a sufficient protection level of surface and ground waters. Water from disposal sites overflows and subsequently infiltrates into surface and ground watercourses.

Electric Power Industry of Serbia is faced with a task of replacing the existing hydraulic ash and slag transport technology, with new thick slurry transport technology. The essence of this new technology is in water - ash ratio (instead of previous 1:10, water and ash are now mixed in the ratio 1:1). This will provide smaller disposal sites, since ten times less water will be used, compared to the amount used currently. On the top of that mass (water and ash mixture), during ash drying, a kind of a cover will be formed through the crystallization process almost preventing ash dispersion or at least reducing it to the minimum.

Thermal power plants Nikola Tesla B2 and Kostolac B will be the first power plants in which the new ash and slag transport technology will be implemented.

Through this procedure, large ESP ash quantities will be obtained, which may be used as the secondary raw material for road surfaces in the construction industry. Ash therefore represents the material of the future: it will be used for dams and road construction, as well as for the production of concrete, cement, gypsum and gypsum products.

NEW ASH HANDLING TECHNOLOGY INTRODUCTION PROJECTS			
Thermal power plant	Start of implementation /end of implementation	Funds in EUR	Source of financing
TPP Nikola Tesla B	2006/2009	30,000,000	EAR donation
TPP Kostolac B	2007/2009	23,500,000	EPS - EBRD loan
TPP Kostolac A	2009/2011	13,000,000	EPS - KfW loan
TPP Kolubara A	2008/2009	12,000,000	Environmental Protection Fund, Republic of Serbia and EPS
TOTAL		78,500,000	

PROJECTS WITH THE VALUE OF EUR 53.5 MILLION (TPP NIKOLA TESLA B AND TPP KOSTOLAC B) ARE CURRENTLY BEING IMPLEMENTED ON ASH DISPOSAL SITES OF EPS THERMAL POWER PLANTS.

PROJECTS THAT NEED TO BE FINALIZED IN THE FUTURE			
Thermal power plant	Start of implementation /end of implementation	Funds in EUR	Source of financing
TPP Kolubara A unit A5	2008/2009	8,000,000	Environmental Protection Fund, Republic of Serbia and EPS
TPP Nikola Tesla A unit A3 – A6	2010/2012	40,000,000	IPA 2009/EPS (expected)
TOTAL		48,000,000	

OTHER PROJECTS			
Thermal power plant	Start of implementation /end of implementation	Funds in EUR	Source of financing
PCB removal from EPS facilities	2009/2010	6,000,000	IPA 2008/EPS
Continuous monitoring of gas emission from TPP Nikola Tesla	2010/2012	3,750,000	IPA 2008/EPS
Modernization of monitoring and control system at TPP Nikola Tesla B	2009/2012	12,000,000	SECO SWISS/ EPS
TOTAL		21,750,000	

WATER PROTECTION

All TPPs and CHPs of Electric Power Industry of Serbia were built in the close vicinity of rivers, since a large water amount is required for their operation. In the course of electricity generation, large amounts of waste waters are created. Cooling manner, type of fuel (mazout or fuel oil) and ash handling technology, as well as chemical water preparation – determine types and amounts of waste waters from TPPs and CHPs. If mazout is used as liquid fuel or light fuel oil, waste waters with increased oil content, i.e. mazout are created.

Pollution prevention of rivers Sava (TPP Nikola Tesla) and Danube (TPPs-OCMs Kostolac) with oil and mazout can be implemented by applying preventive and repair measures. Preventive measures imply supervision of regular operation and overhauls, installation of the so-called ‘floating curtain’, sprinkling of absorption agents in places of possible or permanent oil leakage, placement of vessels (drums or bunds) for oil collection and constant visual control of operational units, auxiliary facilities and rivers. If, however, oil and mazout leakage occurs, repair measures are anticipated for their urgent collection and transport to the storage for temporary disposal within the power plant grounds.

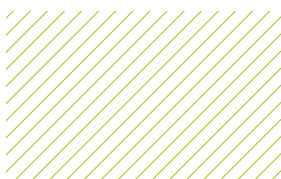
SOIL PROTECTION

In addition to their impact on air quality, ash disposal sites have an impact on quality, i.e. soil contamination level.

Ash disposal sites of Electric Power Industry of Serbia cover the area of 1,200 ha, and it is estimated that by now, about 200 million tons of ash and slag have been disposed in these areas. During ash disposal process under the hydraulic technology, soil and ground water contamination may occur in addition to air pollution, as well as indirect contamination of agricultural products and thereby negative impact on people’s health and other living beings located in the direct vicinity.

Ash disposal sites of TPP Nikola Tesla A and B cover the area of 900 ha, while ash disposal sites of TPPs & OCMs Kostolac cover the approximate area of 250 ha. About 5.5 million tons per year is disposed on them.

Introduction of new ash and slag transport technology, with constant soil reclamation, are the most effective measures for soil protection in the vicinity of ash and slag disposal sites.



02



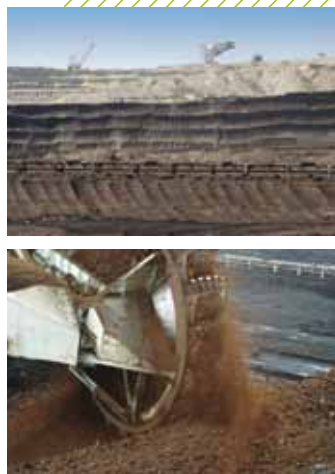
**OPEN CAST
MINES**

COAL MINING IN THE FIRST CENTURY OF THE THIRD MILLENNIUM REMAINS A DOMINANT ACTIVITY FOR ELECTRICITY GENERATION, NOT ONLY IN SERBIA, BUT THROUGHOUT THE WORLD. OPENING OF NEW MINING CAPACITIES IS NOWADAYS ONE OF THE BIGGEST PROJECTS OF THE WORLD ENERGY SECTOR. MODERN EUROPEAN COAL INDUSTRY IS FOCUSED ON RESEARCH AND DEVELOPMENT OF PROCESSES ORIENTED TO MAKING COAL A 'CLEAN' PARTNER.

APPLICATION OF THE "CLEAN COAL" CONCEPT HAS SEVERAL PHASES: THE FIRST PHASE CONSISTS OF INTRODUCTION OF NEW COAL COMBUSTION TECHNOLOGIES WITHOUT HARMFUL EFFECTS, I.E. EMISSION REDUCTION OF NITROGEN OXIDES AND CARBON DIOXIDE PARTICLES; THE SECOND PHASE IMPLIES CONSTANT POWER PLANT EFFICIENCY LEVEL INCREASE, WHILE THE THIRD PHASE REPRESENTS POWER PLANT CONSTRUCTION WITH LOW OR ZERO CARBON-DIOXIDE EMISSION.

IN SERBIA, WITH THE POTENTIAL OF ABOUT 20 BILLION TONS OF COAL, THERE IS ENOUGH POTENTIAL FOR FURTHER DEVELOPMENT OF THE THERMAL POWER SECTOR, WHEREBY THIS ENERGY SOURCE WILL BE THE MAIN ENERGY SOURCE FOR FUTURE ELECTRICITY GENERATION. INTEREST OF ELECTRIC POWER INDUSTRY OF SERBIA IS TO USE COAL IN A SAFE, COST-EFFECTIVE AND CLEAN MANNER. IN ORDER TO ACHIEVE THIS, THERE ARE SOME ACTIVITIES IN THE FIELD OF ENVIRONMENTAL PROTECTION ON OPEN CAST MINES THAT NEED TO BE IMPLEMENTED.

PRODUCTION OF COAL USED AS BASIC FUEL IN THERMAL POWER PLANTS OF EPS UNFOLDS ON OPEN CAST MINES OF KOLUBARA AND KOSTOLAC MINING BASINS. ABOUT 38 MILLION TONS OF COAL IS MINED OUT ANNUALLY ON THEM, WITH 30 MILLION TONS ON FOUR OPEN CAST MINES OF KOLUBARA MINING BASIN, WHILE THE REST IS PRODUCED ON OPEN CAST MINES OF KOSTOLAC MINING BASIN.



AIR PROTECTION

The biggest air pollution on open cast mines occurs during mining operations, transport and loading of coal and overburden. Overburden dumps are especially large air polluters -considering that they contain higher amounts of sand or other bulk material. Air pollution on open cast mines is also caused by operation of mining machinery with internal combustion, when harmful gases are emitted (nitrogen oxides, carbon monoxide and sulphur dioxide).

Corresponding technical solutions for transport and loading, biological reclamation of overburden dumps and degraded areas on open cast mines, as well as greening and maintenance of green areas are applied as protection measures, while attention is also paid to the use of machinery with lower harmful gases emission.

SOIL PROTECTION

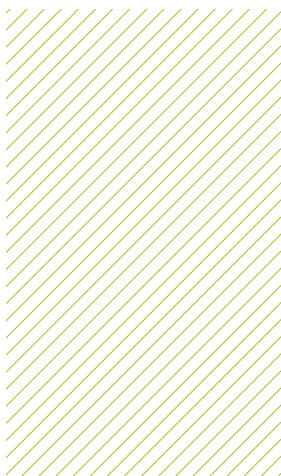
During coal production, especially in the course of open cast mining, in this case in EPS, large land areas are affected. Electric Power Industry of Serbia possesses about 8,500 ha of land used in open cast mining at Kolubara and Kostolac Mining Basins.

Obligation of the natural resource owner, in this case EPS, is to return the degraded soil to its primary purpose. Therefore, the following protective measures are implemented on EPS coal mines: technical and biological land reclamation. Species such as: acacia, elm, black pine, fir, etc are planted on overburden dumps, since they grow successfully on such surfaces.



03

HYDRO POWER SECTOR



ALTHOUGH ENERGY GENERATED IN HYDROPOWER PLANTS COMES FROM RENEWABLE SOURCE – WATER, CONSTRUCTION OF THESE FACILITIES CAN HAVE NEGATIVE ENVIRONMENTAL IMPACTS. THEY ARE REFLECTED ON WATER QUALITY, RIPARIAN AREA, AND LAND DURING FACILITY CONSTRUCTION AND ITS OPERATION. ACTIVATION OF POTENTIAL SLIDING AREAS, MICROCLIMATE CHANGE, CHANGE OF PHYSICAL AND CHEMICAL WATER CHARACTERISTICS, POSSIBILITY OF WATERCOURSE CONTAMINATION BY OIL AND DIFFERENT CHEMICALS FROM HYDRO POWER PLANTS, REPRESENT EXAMPLES OF POSSIBLE NEGATIVE ENVIRONMENTAL IMPACT. EPS HYDROPOWER PLANTS WITH THEIR RESERVOIRS COVER THE AREA OF ABOUT 17,000 ha, HOWEVER, CONSIDERABLY LARGER AREAS NEED TO BE PROTECTED. PROTECTION MEASURES WITHIN THE HYDRO POWER SECTOR ARE RELATED TO THE CONSTRUCTION OF DRAINAGE SYSTEMS, PIPELINES, PUMPING STATIONS, PIEZOMETERS...

**PROTECTION OF SURROUNDING
WATERS AND RIPARIAN AREAS**

CORPORATE ENTERPRISES HYDROPOWER PLANTS DJERDAP, AND DRINSKO - LIMSKE HYDRO POWER PLANTS HAVE SPECIFIC OBLIGATIONS IN TERMS OF ENVIRONMENTAL PROTECTION. HYDROPOWER RESERVOIRS ARE IN FACT, WATER RESERVOIRS IN WHICH DIFFERENT PROCESSES OCCUR: DRIFT DEPOSITION, RIPARIAN AREA EROSION, RIPARIAN AREA FLOODING, CHANGE OF SURROUNDING LAND CONFIGURATION, CHANGES IN AQUATIC ECOSYSTEM, AND LARGE AMOUNTS OF WASTE MATERIAL...



CE HPPs DJERDAP

Construction of two power plants on Danube and creation of reservoirs has largely affected the riparian area from Kusjak to Kladovo, i.e. from HPP Djerdap 1 to Novi Sad on Danube, Sabac on Sava and Becej on Tisa. In the course of construction of HPP Djerdap 1, geographical configuration of a large area has been altered, with 12 settlements relocated and thousands of people, while some 13,000 ha have been flooded; when HPP Djerdap 2 was constructed some 1,500 ha of arable land was also flooded.

Within an extremely spacious area of these two hydropower plants, protection systems cover 282 km of protection dams, more than two million square meters of dam linings, pumping stations, drainage wells.

CE HPPs Djerdap is under obligation to maintain the water level for the purpose of navigation, as well as to avoid endangerment of areas along the river. Level on which Danube is maintained is measured at the confluence of River Nera, with an elevation of 70.3 mASL. Special attention in these power plants is paid to the protection of riparian area: observations are carried out continuously, as well as measurements and analyses of Danube backwater impact to the riparian area and the reservoirs. Concurrently, there are programmes related to measurement and preservation of water quality having an impact on reservoirs.

CE DRINSKO – LIMSKE HPPs

The greatest problem in reservoirs is waste coming along River Drina from Rivers Piva, Lim, Tara and their tributaries. It is estimated that some 7,000 cubic meters of plastic waste floats along River Drina. In addition to environmental impact, floating waste interferes with electricity generation when it gets caught in turbine racks.

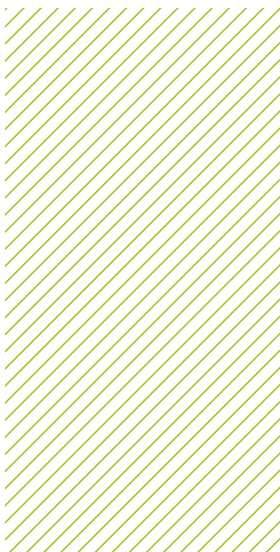
04

DISTRIBUTION ACTIVITY



THE GREATEST PROBLEMS IN CORPORATE ENTERPRISES FOR ELECTRICITY DISTRIBUTION (ELEKTRODISTRIBUCIJA BEOGRAD, ELEKTROVOJVODINA, ELEKTROSRBIJA, JUGOISTOK AND CENTAR) ARE RELATED TO THE PRESENCE OF PYRALENE IN SUBSTATIONS. IN THE MIDDLE OF 20th CENTURY, DUE TO EXTRAORDINARY TECHNICAL CHARACTERISTICS, PYRALENE WAS TREATED AS THE MOST FAVOURABLE DIELECTRIC. HOWEVER, IT WAS LATER ESTABLISHED THAT IT WAS VERY HARMFUL FOR HUMAN HEALTH, I.E. THAT IT HAS CANCERIGENIC, I.E. MUTAGEN EFFECT.

ENVIRONMENTAL MEASURES WITHIN THE DISTRIBUTION ACTIVITY IMPLY REPLACEMENT OF CONDENSERS IN NTC FACILITIES OF SUBSTATIONS, FILLED WITH PYRALENE WITH ENVIRONMENTALLY FRIENDLY CONDENSERS, FILLED WITH BIO-DEGRADABLE SUBSTANCE.



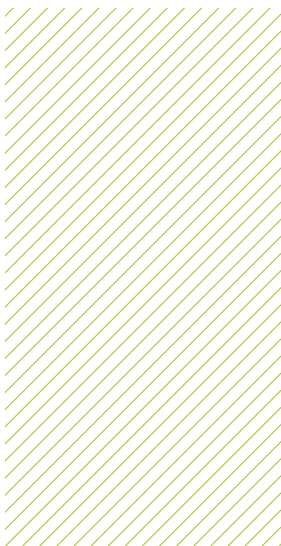
05

WASTE MANAGEMENT

ONE OF THE LARGEST PROBLEMS IN THE FIELD OF ENVIRONMENTAL PROTECTION, NOT ONLY IN FACILITIES OF ELECTRIC POWER INDUSTRY OF SERBIA BUT EVEN ON THE GLOBAL LEVEL IS WASTE CREATION AND MANAGEMENT. NOWADAYS, WASTE IS CONSIDERED AS A RAW MATERIAL IN THE WRONG PLACE.

DIFFERENT TYPES OF WASTE MAY BE FOUND ON ALL FACILITIES OF ELECTRIC POWER INDUSTRY OF SERBIA (PARTS OF ELECTRICAL FACILITIES REPLACED OR REPAIRED, USED MACHINERY, PIPES, ELECTRICAL WASTE, TRANSFORMERS, IONIC MASS, USED OIL, MINERAL WOOL, VARIOUS CONTAMINATED MATERIAL...).

PROTECTION MEASURES IN THIS ENVIRONMENTAL FIELD PRIMARILY INCLUDE WASTE CHARACTERISATION, ITS SEPARATION, REGISTERING, MAXIMUM RE-USE AND FINALLY – SECURE DISPOSAL.



Standards



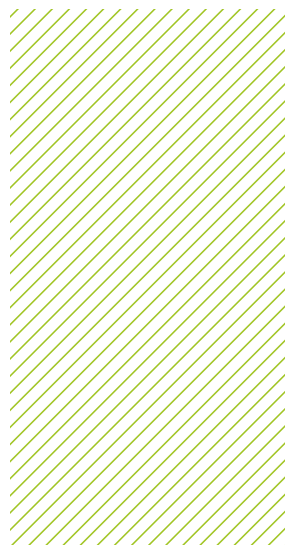
IN ACCORDANCE WITH EUROPEAN UNION DIRECTIVES AND SUSTAINABLE DEVELOPMENT PRINCIPALS, AND AS ONE OF THE STEPS TOWARDS THE EUROPEAN MARKET, IMPLEMENTATION OF THE PROJECT “DEVELOPMENT OF ENVIRONMENTAL MANAGEMENT SYSTEM FOR ELECTRIC POWER INDUSTRY OF SERBIA” IS CURRENTLY IN PROGRESS IN EPS. THE PROJECT WAS INITIATED IN DECEMBER 2004 FOR THE PURPOSE OF TRAINING OF EPS EXPERT TEAMS IN THE DEVELOPMENT AND IMPROVEMENT OF ENVIRONMENTAL MANAGEMENT SYSTEM AND INTRODUCTION OF ISO 14001 STANDARD. IMPLEMENTATION OF THIS STANDARD WILL LEAD TO IMPROVEMENT OF THE COMPANY’S OPERATION AND BUSINESS ACTIVITIES THROUGH THE REDUCTION OF COSTS AND PROFIT INCREASE. THIS STANDARD SHOULD PROVIDE RATIONAL UTILIZATION OF NATURAL RECOURCES AND MINIMIZATION OF HEALTH AND ENVIRONMENTAL HAZARDS.

ISO 14001 STANDARDS HAVE BEEN INTRODUCED UNDER JOINT ACTIVITY OF FOREIGN AND DOMESTIC CONSULTANTS AT THE FOLLOWING ENTERPRISES: CE TPPs NIKOLA TESLA, CE HPPs DJERDAP, CE ELEKTROSRBIJA, AND CE PANONSKJE CHPs. FINAL IMPLEMENTATION OF STANDARDS IS IN PROGRESS, AND IT IS EXPECTED THAT BY THE END OF 2009 THE FOLLOWING CORPORATE ENTERPRISES WILL OBTAIN CERTIFICATES: CE TPPs & OCMs KOSTOLAC, CE ELEKTRODISTRIBUCIJA BEOGRAD, CE JUGOISTOK, CE ELEKTROVOJVODINA, CE CENTAR (SOME FACILITIES HAVE ALREADY BEEN CERTIFIED), CE KOLUBARA MINING BASIN, AND CE DRINSKO-LIMSKE HPPs.

INTEGRATED MANAGEMENT SYSTEM (IMS), INTRODUCED AT THE PUBLIC ENTERPRISE ELECTRIC POWER INDUSTRY OF SERBIA INCLUDES THE FOLLOWING: INTERNATIONAL QUALITY STANDARDS (QMS), ENVIRONMENTAL PROTECTION STANDARDS (EMS) AND OCCUPATIONAL HEALTH AND SAFETY STANDARDS (OHSAS).

Cooperation with institutions and state authorities





PUBLIC ENTERPRISE ELECTRIC POWER INDUSTRY OF SERBIA HAS CONSTANT COOPERATION WITH RELEVANT INSTITUTIONS, ORGANIZATIONS AND STATE AUTHORITIES: MINISTRY OF ENVIRONMENTAL PROTECTION, MINISTRY OF MINING AND ENERGY, ENVIRONMENTAL PROTECTION AGENCY, ENERGY EFFICIENCY AGENCY, RECYCLING AGENCY, ENVIRONMENTAL PROTECTION FUND, "NIKOLA TESLA" INSTITUTE, "JAROSLAV CERNI" INSTITUTE... FOR THE PURPOSE OF SETTling ENVIRONMENTAL PROBLEMS, COORDINATED COOPERATION OF ALL PARTIES COMING FROM THE ENERGY SECTOR IS NECESSARY, COMPETENT GOVERNMENT BODIES, NGO SECTOR...

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