

# ANEX IV





**SUMMARY PROJECT FICHE**

**TPP NIKOLA TESLA B (UNIT B1 - B2)  
FLY GASES DENITRIFICATION**



# STANDARD SUMMARY PROJECT FICHE

## – IPA DECENTRALISED NATIONAL PROGRAMMES

### 1 BASIC INFORMATION

#### 1.1 CRIS Number

EC to complete

#### 1.2 Title

Environmental Protection at EPS - Introduction of NO<sub>x</sub> reduction system - primary measures of NO<sub>x</sub> emission reduction system at TPP NIKOLA TESLA B - unit B1 - B2

#### 1.3 ELARG statistical code

EC to complete

#### 1.4 Location

Republic of Serbia

### Implementing arrangements

#### 1.5 Contracting Authority (EC)

EC Delegation in Serbia

#### 1.6 Implementing Agency

EC Delegation in Serbia

#### 1.7 Beneficiary (including details of project manager)

The SPO will be Assistant Minister Predrag Sekeljic, Ministry of Mining and Energy

Responsible for the management of the project: Mihajlo Gavrić – EPS, Manager of the Environmental Protection Sector, Electric Power Industry of Serbia – EPS

A Steering Committee will be formed consisting of approximately 6 members. It will be chaired by the SPO and it will include representatives of the EC Delegation and other stakeholders such as the Ministry of Mining and Energy, the Ministry of Environment, the Ministry of Finance etc.

#### 1.8 Overall cost

24,000,000 Euro

#### 1.9 EU contribution

18,000,000 Euro

#### 1.10 Final date for contracting

Dec 2011 (n + 3)

#### 1.11 Final date for execution of contracts

Dec 2013 (n + 3 + 2)

#### 1.12 Final date for disbursements

Dec 2014 (n + 3 + 2 + 1)

### 2 OVERALL OBJECTIVE AND PROJECT PURPOSE

#### 2.1 Overall Objective

To reduce the levels of atmospheric pollution generated from TPP Nikola Tesla B, by installing of equipment for the needs of NO<sub>x</sub> reduction system - primary measure of NO<sub>x</sub> emission reduction system thus contributing to environmental harmonisation and removal of serious health hazards.

#### 2.2 Project purpose

To fulfill the Directive 2001/80/EC for large combustion plants by modernising TPP Nikola Tesla B according to the EC Directive 96/62/EC.

#### 2.3 Link with AP/NPAA / EP/ SAA

AP and NPAA are not applicable

The Plan for Implementation of the European Partnership Priorities has listed detailed task with regards to the Environment and Energy sector – 7.3.2 - to begin implementation of the national environmental strategy, 7.3.5 - to implement adopted legislation on industrial pollution, 7.3.12 – to continue to implement the national environmental protection strategy, 7.5.1 to implement the Commitments undertaken within the framework of the Energy Community Treaty.

Commission working document “Serbia 2007 Progress Report” as of 6.11.2007 (SEC(2007) 1435), regarding the Stabilisation and Association Agreement and the European Partnership priorities, where on page 34 stands “Limited progress has been made in implementing legislation on industrial pollution control and risk management. Work on plans to achieve compliance of existing installations with the legal requirements has been initiated, on pilot project basis”.

Under the European Partnership Serbia is committed to “establish an independent Energy Regulatory Agency and carry out environmental audits on energy plants and address worst polluters.”(p. 12). Under Article 111 (Environment) of the SAA, Serbia is obliged to halt further degradation and start improving the environmental situation with the aim of sustainable development. Stockholm Convention;

This project is strongly linked with the quoted documents, tasks and expectations.

The Energy Community Treaty signed multilaterally by the EU Commission and Balkan countries introduces the legal requirement for Serbia to implement the Acquis on the Environment. Annex II of the Treaty sets the deadline of 31 December 2017 for implementation of the Directive 2001/80/EC (the ‘large power plant’ Directive) and Directive 96/59/EC, which is a relatively

short period for such a major programme of works, and with such a high cost.

Under the European Partnership Serbia is committed to “establish an independent Energy Regulatory Agency and carry out environmental audits on energy plants and address the worst polluters.” (p. 12).

Under Article 111 (Environment) of the SAA, Serbia is obliged to halt further degradation and start improving the environmental situation with the aim of sustainable development. ...Cooperation could also centre on the development of strategies to significantly reduce local, regional and trans-boundary air and water pollution, to establish a system for efficient, clean, sustainable and renewable production and consumption of energy. (p59).

## 2.4 Link with MIPD

Energy: Compliance support to meet the needs of the Regional Energy Treaty, relevant Community Directives and regional market obligations; compliance of legislation with the acquis. (p. 23)

Environment: Support to the approximation and implementation of Environmental legislation and related strategies... (p. 22)

The benefit from this project will be the implementation of the EU Directives 2001/80/EC for large combustion plants.

## 2.5 Link with National Development Plan (where applicable)

n/a

## 2.6 Link with national / sectoral plans

The project is in accordance with all of the following strategic documents:

- Sustainable Development Strategy of the Republic of Serbia
- The Programme of Energy Development Strategy Implementation of the Republic of Serbia by 2015 for the period from 2007 to 2015
- National Environmental Programme of the Republic of Serbia (NEAP RS)
- The Framework Plan of the Electric Power Industry of Serbia for the Reduction of Harmful Substances Emission from EPS TPPs considered within the Study: ‘Emission Control from Coal-Fired TPPs of Electric Power Industry of Serbia’, was financed by the European Agency for Reconstruction during 2003. The Plan was developed in cooperation with EPS, Ministry of Mining and Energy and Ministry of the Protection of Natural Resources and Environmental Protection of the Republic of Serbia.
- The Pre-feasibility Study for Emission Control for Coal-Fired Power Plants, financed for EAR during 2003 by RWE Innogy, established the priority facilities for harmful substance emission alignment from EPS TPPs.

- The new Serbian Environmental Protection Law anticipates continuous control of air emission of harmful substances for all TPPs.
- Sustainable development and environmental management measures were planned for the next ten years for the Republic of Serbia within the National Environmental Program of the Republic of Serbia (NEAP RS – Draft) adopted in accordance with the Environmental Protection Law (Official Gazette RS № 135/04).

The proposed project is in the field of air quality protection, one of the first priorities which is one part of the restructuring of environmental protection in EPS, and represents some 70% of the problem of environmental protection in the Republic of Serbia.

## 3 DESCRIPTION OF PROJECT

### 3.1 Background and justification

During the last decade of the twentieth century, Serbia had many problems such as social-economic setbacks, isolation and a difficult inheritance which resulted in Serbia neglecting environmental issues. As the country emerges from this period, fresh attention is being given to the environment so that technical and energy-related development assumes a cleaner nature than hitherto. The Electric Power Industry of Serbia (EPS) with its activities - starting from natural resources, coal and hydro potential to the generation, transmission and distribution of electricity - has a great impact on the natural state of environment. Thermal power facilities are without a doubt the biggest polluters of air, compared to other plants and facilities within EPS. In accordance with the Serbian policy of association and harmonisation with the EU and its standards, the Electric Power Industry of Serbia decided to give first priority to respecting the EU environmental standards.

#### *Flue gases from TPPs*

During the construction of the existing TPPs, there were no legal regulations concerning emission limits at the republic level, so no measures were taken to reduce sulphur and nitrogen oxide emission into the atmosphere. Measures taken to reduce dust emission do not meet the current emission requirements and limits, both of the domestic and EU regulations. Emission alignment of these facilities with the requirements of the EU regulations is required in the forthcoming period.

Measuring equipment for continuous emission measurement was not installed in thermal power plants - concentration level of dust and gases (SO<sub>2</sub>, NO<sub>x</sub>, CO, CO<sub>2</sub>) in flue gases. Emission control is carried out once a year by the authorised institution.

Equipment for dust treatment of flue gases - electrostatic precipitators (ESP) - was installed in Nikola Tesla B Thermal Power Plant as an air protection measure when it was constructed in 1984-1985 without desulphurisation and denitrification of flue gases. Flue gases of this unit are emitted into the atmosphere over a stack with the height H=280m, therefore the operating state of the electrostatic



precipitator has a direct impact on air pollution of the immediate environment.

After about 23 years of operation, the large scale emissions from the thermal power plant due to the lack of effective ESPs leads in particular to significant deposits of heavy particles and emissions of sulphur and nitrogen oxides in the surrounding areas which experience a high incidence of respiratory illnesses, particularly among children and acid rains in transboundary context. This pollution also causes damage to crops, agricultural products and forestry. Power station plumes can travel considerable distances with little dilution.

Since 2000, EPS has taken a series of actions aimed at improvement of the operation of thermal units, as well

as increase of the availability and reliability of units in operation. By 2004, within the capital overhaul and regular overhauls, special attention was paid to the ESP, with the purpose of bringing the existing ESP after ten-year operation to the maximum reliability level within the existing technologies, FGD, DENOX existing technologies and reconstruction of ash handling systems in EPS TPPs.

Since 2004, alignment of EPS operation with the legal regulations has been started. Other projects were also launched related to environmental improvement around the TPP and on a broader level. Performed reconstructions at EPS TPPs in the period between 2004 and 2007 include:

### Electrostatic precipitators of fly gases

Replacement of the existing ESPs with new ones:

TPP	Unit	Year of reconstruction	Financing
Nikola Tesla A	A1, A2, A4, A5, A6	2004 - 2009	EU (EAR, IPA), SEPF, EPS
Nikola Tesla B	B1, B2	2009 - 2010 (expected)	EU (IPA)
Kolubara A	A5	2008 - 2009	SEPF
Morava (Svilajnac)	A	2010	EU (IPA)
Kostolac A	A1, A2	2004 - 2006	EU (EAR), EPS
Kostolac B	B1, B2	2009 - 2011 (expected)	SEPF, EPS

ESP reconstruction of Units are based on the EAR's Feasibility Study of 2003

### Ash handling systems

Replacement of the existing Ash handling systems ESPs with new ones:

TPP	Year of reconstruction	Cost (mil. €)	Financing
Nikola Tesla A	2010 - 2012 (expected)	40.0	EU IPA)
Nikola Tesla B	2007 - 2009	35.0	EU (EAR)
Kolubara A	2008 - 2009	5.0	SEPF
Morava (Svilajnac)	2010	4.0	EPS
Kostolac A	2009 - 2010	13.0	KfW loan - EPS
Kostolac B	2007 - 2009 (expected)	17.0	EBRD loan - EPS

### Flue gas desulphurisation plants

Building of new ones:

TPP	Planned Year	Cost (mil. €)	Financing
Nikola Tesla A	2012 - 2015	170.0	EPS
Nikola Tesla B	2010 - 2013 (expected)	210.0	EU (IPA), EPS
Kostolac B	2009 - 2011 (expected)	125.0	SEPF, NIP, EPS

Legend :  
 EU - European Union  
 SEPF - Serbian Environmental Protection Fond  
 NIP - National Investment Fond  
 EPS - Electric Power Industry of Serbia

By aligning electrostatic precipitator operation with requirements of the EU regulations for dust emission reduction, the total dust emission from TPP Nikola Tesla A and TPP Nikola Tesla B, after performed ESP reconstruction on TPP Nikola Tesla A - Units 1, A2, A3, A4 and A5, was reduced by 85%; while the total dust emission at TPP Kostolac A and TPP Kostolac B was reduced after ESP reconstruction on Units A1 and A2 by 54%.

Pursuant to the Law on Integrated Pollution Prevention and Control, TPP Nikola Tesla (TPP Nikola Tesla A, TPP Nikola Tesla B, TPP Kolubara (Unit A5) and TPP Morava) should obtain an operation permit by 2015, while one of the conditions for obtaining of this permit is alignment of their operation with the requirements of legal regulations, related to the continuous emission measurements.

Between 2003–2007 during the ESP reconstruction, equipment for continuous air emission measurement of harmful and hazardous substances was installed at a number of TPPs, but some remained uncontrolled. This project is designed to address this lack.

In addition to this, introduction of NO<sub>x</sub> reduction system – primary measure of NO<sub>x</sub> emission reduction system would be carried out in the context of Serbian legislation. In accordance with the Law on Integrated Pollution Prevention and Control, TPP Nikola Tesla B should obtain an operating permit by 2015; whereas one of the conditions for this is harmonisation of TPP plant operation with emission limit values (ELV) of harmful substances into air, and through that with emission limit values for sulphur oxides.

In case that this project is not implemented by 2015, PE EPS would not be able to meet the requirements of both Serbian and EU legislation.

### 3.2 Assessment of project impact, catalytic effect, sustainability and cross border impact (where applicable)

#### Impact

After the implementation of the project and introduction of NO<sub>x</sub> reduction system – primary measures of NO<sub>x</sub> emission reduction system at TPP Nikola Tesla B, nitrogen oxides emission reduction will be from 345 - 470 mg/m<sup>3</sup> to 200 mg/m<sup>3</sup> which will have an impact on the air quality improvement around the TPP and also into the cross border context, reduction of soil and forestry contamination and reduction of the number of people suffering from respiratory illnesses in this area. In addition to this, analyzers for continuous dust emission measurement in flue gases after the new equipment for the needs of NO<sub>x</sub> reduction system – primary measures of NO<sub>x</sub> emission reduction system will be installed, enabling constant control of ESP operation.

This project will also enable continuous monitoring of emission of harmful substances from flue gases of the power plant of EPS, TPP Nikola Tesla B, situated nearby the town of Obrenovac (about 30 000 inhabitants), and 40 km away from Belgrade.

Quality emission monitoring would enable improvement of air quality around the TPP. The number of people suffering from respiratory illnesses, now increasing in this area, would be reduced. Harmful impact on soil would also be reduced around the facilities through constant control of operational efficiency of the plant after introduction of NO<sub>x</sub> reduction system - primary measures of NO<sub>x</sub> emission reduction system.

#### Catalytic effects

The health of the working and the youngest population will be improved, with all direct and indirect effects: reduction of health costs, both curative and preventive for all levels and age groups of population; increased efficiency of the working part of population; reduced pollution of agricultural surfaces; improved economy of the affected areas.

It is difficult to enforce environmental legislation in the private sector when the bulk of pollution is the responsibility of such a large public organisation as EPS. When EPS has cleaned up its operations, general enforcement will be easier to implement and better justified.

#### Sustainability

The Government Memorandum on budget for 2008 with projections for 2009 and 2010 shows that the Government commits itself to undertake gradual annual tariff adjustments in order to reach cost-recovering tariffs for electricity in compliance with European levels, thus allowing EPS to raise finance for investment in environmental projects. The current round of investment through donor financing should therefore represent a one-off improvement to bring the Serbian power generating capacity to a point where sustainable further development is possible without subsidy or further donor intervention.

Through adoption and approximation of Serbian legislation to the EU standards, far greater attention in future will be given to potentially hazardous substances, and avoiding a repeat of the present situation will become a mainstream task of energy producers and environmental agencies alike.

### 3.3 Results and measurable indicators

#### Component

A new equipment for the needs of NO<sub>x</sub> reduction system – primary measures of NO<sub>x</sub> emission reduction system procured and installed at TPP Nikola Tesla B that will significantly reduce atmospheric pollution in the region.

Measurable indicators will be:

- Degree of compliance with a procurement and installation schedule to be developed with the tender documentation;
- Performance characteristics of the equipment and facilities provided by the supplier;
- National and EU standards concerning the quality of air;
- Number of operation staff trained.



### 3.4 Activities

#### Activities related to component

1. Manufacture and transport of equipment
2. Installation of equipment
3. Commissioning with all accompanying tests
4. Maintenance crew trained; training of EPS staff for supervision and continuous maintenance of equipment and facilities
5. Continuous operation of the facility and analysis of operation results.

All activities should be carried out in accordance with the latest domestic and EU legislation.

### 3.5 Contracting arrangements:

#### Component

There will be one supply contract for equipment including works that will be carried out by the equipment suppliers. Supervision and testing will be carried out by the staff of EPS.

### 3.6 Conditionality and sequencing

It will be a condition that the technical specifications are prepared by the beneficiary. Implementation of the works must be overseen by a qualified supervising engineer. For operational reasons (the need to operate the power plants during the peak winter period) works on installation of equipment for the needs of NO<sub>x</sub> reduction system – primary measures of NO<sub>x</sub> emission reduction system must be undertaken during the planned plant shutdown periods.

### 3.7 Linked activities

Since 2000, EPS has taken a series of actions aimed at the improvement of operation of thermal units, as well as availability and reliability increase of units in operation.

By 2004, within the capital overhaul and regular overhauls, special attention was paid to the ESP, with the purpose to bring the existing ESP after ten-year operation to the maximum reliability level within the existing technologies. Since 2004, alignment of EPS operation with the legal regulations has been started.

Other projects were also launched related to environment improvement around the TPP and on a broader level:

- Capital overhauls of units A3 TPP Nikola Tesla A, reconstruction of ESP (€64.5 m CARDS 2002)
- Study of pollution from thermal power stations in Serbia and on pollution mitigation measures and their costs (€0.75 m CARDS 2003)
- Reconstruction of Unit A1, A2, A4 and A5 ESPs, TPP Nikola Tesla A between 2004-2007 (€58 m)
- Reconstruction of Unit A2, ESPs, TPP Kostolac A, 2006 year, financed by EAR.
- Environmental clean up measures (based on the study undertaken under the 2003 programme) (Electrostatic precipitators at Kostolac A and ash transport and storage at Nikola Tesla B power plant (€35 m).
- Ash handling system reconstruction with the thick slurry system at TPP Nikola Tesla B, through which reduction of ash dispersion from the ash disposal will be achieved. Project implementation has been started in 2007, financed by EAR.
- Ash handling system reconstruction with the thick slurry system at TPP Kostolac B, through which reduction of ash dispersion from the ash disposal will be achieved. Project implementation has been started in 2007, financed by EBRD loan to EPS.

### 3.8 Lessons learned

Experience on reconstruction executed so far has shown that equipment delivery period from abroad was prolonged, having an impact on the completion of the planned reconstruction implemented during overhauls, whose beginning and duration period is limited during the year. This is the reason why the tenders for procurement and delivery of the equipment necessary for the reconstruction should be planned earlier, since equipment comes from abroad.

Participation of domestic firms in the reconstruction was assessed as positive and they have demonstrated their technical ability to carry out the reconstruction to the end.

## 4 INDICATIVE BUDGET (AMOUNTS IN M€)

Activities	TOTAL PUBLIC COST	SOURCES OF FUNDING										
		EU CONTRIBUTION				NATIONAL PUBLIC CONTRIBUTION						PRIVATE
		Total	% *	IB	INV	Total	Type of cofinancing (J / P) **	% *	Central	Regional	IFIs	
Activity 1												
contract 1.	24.00	18.00	75%		18.0	6.0	P	25%	6.0			
TOTAL	24.00	18.00	75%		18.0	6.0	P	25%	6.0			

Amounts net of VAT

\* expressed in % of the Total Public Cost

## 5 INDICATIVE IMPLEMENTATION SCHEDULE

Contracts	Start of Tendering	Signature of contract	Project Completion
Contract 1	T + 1Q	T + 4Q	T + 10Q

## 6 CROSS CUTTING ISSUES

### 6.1 Equal Opportunity

The beneficiary will make sure its objectives, policies and interventions have a positive impact on and are in line with the main principles of gender equality. It will ensure equal opportunities clauses in all tendering material for procurement of equipment.

### 6.2 Environment

The objective of this project is to help Serbia to achieve compliance with the Environmental Acquis, as required by the Energy Community Treaty. This project will thus directly involve mainstreaming of environmental issues.

### 6.3 Minorities

As minorities and other vulnerable groups are usually the first to suffer from environmental degradation, and have the least chance of protecting themselves (e.g. by choosing residences in non-polluted areas), this project will improve their conditions in terms of reduced health hazards.

## ANNEX 1: LOGICAL FRAMEWORK MATRIX

Project is proposed by the Ministry of Mining and Energy, with the main beneficiary being the Public Enterprise Electric Power Industry of Serbia. Total value of the project amounts to 24 million Euros, out of which 18.0 million euros is the proposed EU contribution and the remaining 6.0 million euros the national co-financing. This project is the last phase of an integrated programme for upgrading of the facilities at TPP Nikola Tesla B; this programme's objective is to rectify in a logical manner the legacy of many years of environmental degradation. Investment-technical documents for this project will be finalised in the end of 2009. The proposals that form the basis for this project have been scrutinised by the Ministry of Environmental Protection and Spatial Planning, an EIA will be conducted and approved and the various planning and construction permits will be obtained. The appropriate technological solution has been chosen and approved. The project's main objective is to reduce atmospheric pollution generated by TPP Nikola Tesla B thus contributing to environmental harmonization and removal of serious health hazards by fulfilling the Directive 2001/80/EC for large combustion plants (modernizing specified Thermal Power Plants) and 96/62/EC. Project result includes procurement and installation equipment for the needs of NO<sub>x</sub> reduction system – primary measures of NO<sub>x</sub> emission reduction system at TPP Nikola Tesla B.



LOGFRAME PLANNING MATRIX FOR PROJECT FICHE		Project Title: Environmental Protection at EPS – Introduction of NO <sub>x</sub> reduction system – primary measures of NO <sub>x</sub> emission reduction system TPP NIKOLA TESLA B (unit B1 - B2)	
		Total budget: 24,000,000 Euro	IPA budget: 18,000,000 Euro
OVERALL OBJECTIVE	Objectively verifiable indicators	Sources of Verification	
To reduce the levels of atmospheric pollution generated from TPP Nikola Tesla B, by installing equipment for the needs of NO <sub>x</sub> reduction system – primary measure of NO <sub>x</sub> emission reduction system thus contributing to environmental harmonisation and removal of serious health hazards	Serbian practice in line with the EU norms. Reduction of the level of nitrogen oxides in ambient air in the region surrounding the TPP Reduction of soil contamination Reduction of transboundary transport of nitrogen oxides and contamination Reduction of influence of acid rains soil contamination and forestry Reduction of incidence of diseases associated with environmental contaminants	EPS reports Annual report of Environmental Protection Agency on air quality within the impact zone Annual statistics report of the Ministry of Health on the number of people suffering from respiratory illnesses	
SPECIFIC PROJECT PURPOSE	Objectively verifiable indicators	Sources of Verification	Assumptions
To fulfill the Directive 2001/80/EC for large combustion plants by modernising TPP Nikola Tesla B according to the EC Directive 96/62/EC	Consistency of emissions control at TPPs over a longer period State of EPS installations and surrounding environment in comparison with the EU norms. Air quality indicators improved to the level defined by EU standards	EPS / TPP technical reports Reports of the Serbian Environmental Protection Agency Annual Report on the State of Environmental Protection of the Electric Power Industry of Serbia Local and nation media reports	EU standards do not change while the project is being implemented.

RESULTS	Objectively verifiable indicators	Sources of Verification	Assumptions
New equipment for the needs of NO <sub>x</sub> reduction system – primary measure of NO <sub>x</sub> emission reduction system procured and installed at TPP Nikola Tesla B that will significantly reduce atmospheric pollution in the region.	<p>Degree of compliance with a procurement and installation schedule to be developed with the tender documentation.</p> <p>Performance characteristics of the equipment and facilities provided by the supplier</p> <p>National and EU standards concerning the quality of air</p> <p>Number of operation staff trained</p>	<p>Project reports</p> <p>Contract with the supplier</p> <p>Technical specification of the Supplier</p> <p>Reports of the Serbian Environmental Protection Agency</p> <p>Annual Report on the State of Environmental Protection of the Electric Power Industry of Serbia</p> <p>Issued certificates to the operational staff in TPP Nikola Tesla B</p>	<p>Continued support by top management of EPS for issues of environmental protection.</p> <p>National Authorities committed to the fulfillment of EU standards in the environmental sector</p> <p>Political stability and continuation of harmonization process with EU</p>
ACTIVITIES	Means	Means & Costs	Assumptions
<p>Manufacture and transport of equipment</p> <p>Installation of equipment</p> <p>Commissioning with all accompanying tests</p> <p>Maintenance crew trained; training of EPS staff for supervision and continuous maintenance of equipment and facilities</p> <p>Continuous operation of the facility and analysis of operation results.</p>		<p>24 m€</p> <p>This project will be implemented through a ‘turnkey’ contract, according to FIDIC procedures to design, build and supervise the supply, commissioning and initial operation of new facilities and equipment with appropriate monitoring personnel supplied by EPS.</p>	<p>Competent and qualified consulting and engineering companies interested and available for the project</p> <p>Willingness of TPP Nikola Tesla B staff to apply new production &amp; control technologies</p> <p>Equipments and the facilities available on the market</p>



## ANNEX 2: AMOUNTS (IN €) CONTRACTED AND DISBURSED BY QUARTER FOR THE PROJECT

(IPA contribution only)

Contracted	2009				2010				2011				Total
	QR1	QR2	QR3	QR4	QR1	QR2	QR3	QR4	QR1	QR2	QR3	QR4	
Contract				18.0 m€									18.0 m€
<b>Cumulated</b>				18.0 m€									18.0 m€
<b>Disbursed</b>													
Contract				9.0 m€							9.0 m€		18.0 m€
<b>Cumulated</b>				9.0 m€							9.0 m€		18.0 m€

## ANNEX 3: INSTITUTIONAL FRAMEWORK – LEGAL RESPONSIBILITIES AND STATUTES

Close cooperation of the PE EPS and the following institutions is necessary:

- Ministry of Mining and Energy;
- Ministry of Finance;
- Ministry of Environment and Spatial Planning;
- Municipalities and local communities on whose territory TPP is located.

## ANNEX 4: REFERENCE TO LAWS, REGULATIONS AND STRATEGIC DOCUMENTS

Reference list of relevant laws and regulations:

- Directive 2001/80/EC defining harmful substances emission limit values from large combustion plants;
- Directive 96/62/EC - framework, related to the quality of ambient air;
- Convention on Long-Distance Cross-Border Air Pollution;
- Contract on the Founding of SE Europe Energy Community, which came into force in July 2006, within which implementation of the Directive 2001/80/EC is planned;
- Law on Environmental Protection - Official Gazette RS № 135/04;
- Law on Integrated Pollution Prevention and Control - Official Gazette RS № 135/04;
- Draft Law on Air Protection;
- Energy Development Strategy by 2015 (Republic of Serbia);
- The Programme of Energy Development Strategy Implementation of the Republic of Serbia by 2015 for the period from 2007 and 2012;
- Sustainable Development Strategy of the Republic of Serbia
- National Environmental Programme of the Republic of Serbia (NEAP RS);
- Ratification Law of Kyoto Protocol on Long-Distance Cross-Border Air Pollution;

- Legal requirement concerning operation harmonisation of existing units with ELV requirements for air emission of harmful substances: Environmental Protection Law (Republic of Serbia) and the Law on Integrated Pollution Prevention and Control (Republic of Serbia);
- Orientation of the Electric Power Industry of Serbia towards the fulfillment of all EU norms and standards from the subject field;
- Framework Plan of the Electric Power Industry of Serbia for the Reduction of Harmful Substances Emission from EPS TPPs considered within the Study: 'Emission Control from Coal-Fired TPPs of Electric Power Industry of Serbia', financed by the European Agency for Reconstruction during 2003. The Plan was developed in cooperation with EPS, Ministry of Mining and Energy and Ministry of the Protection of Natural Resources and Environmental Protection of the Republic of Serbia.

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## ANNEX 5: DETAILS PER EU-FUNDED CONTRACT (\*) WHERE APPLICABLE

### Component

New equipment for the needs of NO<sub>x</sub> reduction system – primary measures of NO<sub>x</sub> emission reduction system procured and installed at TPP Nikola Tesla B, with output of nitrogen oxides concentration of 200 mg/m<sup>3</sup>.

Measuring equipment for continuous emission measurement of harmful and hazardous substance on thermal power plants to measure:

- emission parameters: SO<sub>2</sub>, NO<sub>x</sub> (reduced to NO<sub>2</sub>), CO, CO<sub>2</sub>, dust,
- operation parameters: temperature, oxygen.



**SUMMARY PROJECT FICHE**

**TPP KOSTOLAC B (UNIT B1 - B2)  
FLY GASES DENITRIFICATION**



# STANDARD SUMMARY PROJECT FICHE

## – IPA DECENTRALISED NATIONAL PROGRAMMES

### 1 BASIC INFORMATION

#### 1.1 CRIS Number

EC to complete

#### 1.2 Title

Environmental Protection at EPS Introduction of NO<sub>x</sub> reduction system - primary measures of NO<sub>x</sub> emission reduction system at TPP KOSTOLAC B - unit B1 - B2

#### 1.3 ELARG statistical code

EC to complete

#### 1.4 Location

Republic of Serbia

### Implementing arrangements

#### 1.5 Contracting Authority (EC)

EC Delegation in Serbia

#### 1.6 Implementing Agency

EC Delegation in Serbia

#### 1.7 Beneficiary (including details of project manager)

The SPO will be Assistant Minister Predrag Sekeljic, Ministry of Mining and Energy

Responsible for the management of the project: Mihajlo Gavrić - EPS, Manager of the Environmental Protection Sector, Electric Power Industry of Serbia - EPS

A Steering Committee will be formed consisting of approximately 6 members. It will be chaired by the SPO and it will include representatives of the EC Delegation and other stakeholders such as the Ministry of Mining and Energy, the Ministry of Environment, the Ministry of Finance etc.

#### 1.8 Overall cost

12,000,000 Euro

#### 1.9 EU contribution

9,000,000 Euro

#### 1.10 Final date for contracting

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Dec 2013 (n + 3 + 2)

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#### 2.2 Project purpose

To fulfill the Directive 2001/80/EC for large combustion plants by modernising TPP Kostolac B according to the EC Directive 96/62/EC.

#### 2.3 Link with AP/NPAA / EP/ SAA

AP and NPAA are not applicable

The Plan for Implementation of the European Partnership Priorities has listed detailed task with regards to the Environment and Energy sector - 7.3.2 - to begin implementation of the national environmental strategy, 7.3.5 - to implement adopted legislation on industrial pollution, 7.3.12 - to continue to implement the national environment protection strategy, 7.5.1 to implement the Commitments undertaken within the framework of the Energy Community Treaty.

Commission working document "Serbia 2007 Progress Report" as of 6.11.2007 (SEC(2007) 1435), regarding the Stabilisation and Association Agreement and the European Partnership priorities, where on page 34 stands "Limited progress has been made in implementing legislation on industrial pollution control and risk management. Work on plans to achieve compliance of existing installations with the legal requirements has been initiated, on pilot project basis".

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This project is strongly linked with the quoted documents, tasks and expectations.

The Energy Community Treaty signed multilaterally by the EU Commission and Balkan countries introduces the legal requirement for Serbia to implement the Acquis on the Environment. Annex II of the Treaty sets the deadline of 31 December 2017 for implementation of the Directive 2001/80/EC (the 'large power plant' Directive) and Directive 96/59/

EC, which is a relatively short period for such a major programme of works, and with such a high cost.

Under the European Partnership Serbia is committed to “establish an independent Energy Regulatory Agency and carry out environmental audits on energy plants and address the worst polluters.” (p. 12).

Under Article 111 (Environment) of the SAA, Serbia is obliged to halt further degradation and start improving the environmental situation with the aim of sustainable development. ...Cooperation could also centre on the development of strategies to significantly reduce local, regional and trans-boundary air and water pollution, to establish a system for efficient, clean, sustainable and renewable production and consumption of energy. (p59)

## 2.4 Link with MIPD

Energy: Compliance support to meet the needs of the Regional Energy Treaty, relevant Community Directives and regional market obligations; compliance of legislation with the acquis. (p. 23)

Environment: Support to the approximation and implementation of Environmental legislation and related strategies...(p. 22)

The benefit from this project will be the implementation of the EU Directives 2001/80/EC for large combustion plants.

## 2.5 Link with National Development Plan (where applicable)

n/a

## 2.6 Link with national / sectoral plans

The project is in accordance with all of the following strategic documents:

- Sustainable Development Strategy of the Republic of Serbia
- The Programme of Energy Development Strategy Implementation of the Republic of Serbia by 2015 for the period from 2007 to 2015
- National Environmental Programme of the Republic of Serbia (NEAP RS)
- The Framework Plan of the Electric Power Industry of Serbia for the Reduction of Harmful Substances Emission from EPS TPPs considered within the Study: ‘Emission Control from Coal-Fired TPPs of Electric Power Industry of Serbia’, was financed by the European Agency for Reconstruction during 2003. The Plan was developed in cooperation with EPS, Ministry of Mining and Energy and Ministry of the Protection of Natural Resources and Environmental Protection of the Republic of Serbia.
- The Pre-feasibility Study for Emission Control for Coal-Fired Power Plants, financed for EAR during 2003 by RWE Innogy, established the priority facilities for harmful substance emission alignment from EPS TPPs.

- The new Serbian Environmental Protection Law anticipates continuous control of air emission of harmful substances for all TPPs.
- Sustainable development and environmental management measures were planned for the next ten years for the Republic of Serbia within the National Environmental Program of the Republic of Serbia (NEAP RS - Draft) adopted in accordance with the Environmental Protection Law (Official Gazette RS № 135/04).

The proposed project is in the field of air quality protection, one of the first priorities which is one part of the restructuring of environmental protection in EPS, and represents some 70% of the problem of environmental protection in the Republic of Serbia.

## 3 DESCRIPTION OF PROJECT

### 3.1 Background and justification

During the last decade of the twentieth century, Serbia had many problems such as social-economic setbacks, isolation and a difficult inheritance which resulted in Serbia neglecting environmental issues. As the country emerges from this period, fresh attention is being given to the environment so that technical and energy-related development assumes a cleaner nature than hitherto. The Electric Power Industry of Serbia (EPS) with its activities - starting from natural resources, coal and hydro potential to the generation, transmission and distribution of electricity - has a great impact on the natural state of environment. Thermal power facilities are without a doubt the biggest polluters of air, compared to other plants and facilities within EPS. In accordance with the Serbian policy of association and harmonisation with the EU and its standards, the Electric Power Industry of Serbia decided to give first priority to respecting the EU environmental standards.

#### *Flue gases from TPPs*

During the construction of the existing TPPs, there were no legal regulations concerning emission limits at the republic level, so no measures were taken to reduce sulphur and nitrogen oxide emission into the atmosphere. Measures taken to reduce dust emission do not meet the current emission requirements and limits, both of the domestic and EU regulations. Emission alignment of these facilities with the requirements of the EU regulations is required in the forthcoming period.

Measuring equipment for continuous emission measurement was not installed in thermal power plants - concentration level of dust and gases (SO<sub>2</sub>, NO<sub>x</sub>, CO, CO<sub>2</sub>) in flue gases. Emission control is carried out once a year by the authorised institution.

Equipment for dust treatment of flue gases - electrostatic precipitators (ESP) - was installed in Kostolac B Thermal Power Plant as an air protection measure when it was constructed in 1988-1991 without desulphurisation and denitrification of flue gases. Flue gases of this unit are emitted into the atmosphere over a stack with the height H=250 m, therefore the operating state of the electrostatic



precipitator has a direct impact on air pollution of the immediate environment.

After about 18 years of operation, the large scale emissions from the thermal power plant due to the lack of effective ESPs leads in particular to significant deposits of heavy particles and emissions of sulphur and nitrogen oxides in the surrounding areas which experience a high incidence of respiratory illnesses, particularly among children and acid rains in transboundary context. This pollution also causes damage to crops, agricultural products and forestry. Power station plumes can travel considerable distances with little dilution.

Since 2000, EPS has taken a series of actions aimed at improvement of the operation of thermal units, as well

as increase of the availability and reliability of units in operation. By 2004, within the capital overhaul and regular overhauls, special attention was paid to the ESP, with the purpose of bringing the existing ESP after ten-year operation to the maximum reliability level within the existing technologies, FGD, DENOX existing technologies and reconstruction of ash handling systems in EPS TPPs.

Since 2004, alignment of EPS operation with the legal regulations has been started. Other projects were also launched related to environmental improvement around the TPP and on a broader level. Performed reconstructions at EPS TPPs in the period between 2004 and 2007 include:

### Electrostatic precipitators of fly gases

Replacement of the existing ESPs with new ones:

TPP	Unit	Year of reconstruction	Financing
Nikola Tesla A	A1, A2, A4, A5, A6	2004 - 2009	EU (EAR, IPA), SEPF, EPS
Nikola Tesla B	B1, B2	2009 - 2010 (expected)	EU (IPA)
Kolubara A	A5	2008 - 2009	SEPF
Morava (Svilajnac)	A	2010	EU (IPA)
Kostolac A	A1, A2	2004 - 2006	EU (EAR), EPS
Kostolac B	B1, B2	2009 - 2011 (expected)	SEPF, EPS

ESP reconstruction of Units are based on the EAR's Feasibility Study of 2003.

### Ash handling systems

Replacement of the existing Ash handling systems ESPs with new ones:

TPP	Year of reconstruction	Cost (mil. €)	Financing
Nikola Tesla A	2010 - 2012 (expected)	40.0	EU IPA)
Nikola Tesla B	2007 - 2009	35.0	EU (EAR)
Kolubara A	2008 - 2009	5.0	SEPF
Morava (Svilajnac)	2010	4.0	EPS
Kostolac A	2009 - 2010	13.0	KfW loan - EPS
Kostolac B	2007 - 2009 (expected)	17.0	EBRD loan - EPS

### Flue gas desulphurisation plants

Building of new ones:

TPP	Planned Year	Cost (mil. €)	Financing
Nikola Tesla A	2012 - 2015	170.0	EPS
Nikola Tesla B	2010 - 2013 (expected)	210.0	EU (IPA), EPS
Kostolac B	2009 - 2011 (expected)	125.0	SEPF, NIP, EPS

Legend :  
 EU - European Union  
 SEPF - Serbian Environmental Protection Fond  
 NIP - National Investment Fond  
 EPS - Electric Power Industry of Serbia

By aligning electrostatic precipitator operation with requirements of the EU regulations for dust emission reduction, the total dust emission from TPP Nikola Tesla A and TPP Nikola Tesla B, after performed ESP reconstruction on TPP Nikola Tesla A - Units 1, A2, A3, A4 and A5, was reduced by 88%; while the total dust emission at TPP Kostolac A and TPP Kostolac B was reduced after ESP reconstruction on Units A1 and A2 by 54%.

Pursuant to the Law on Integrated Pollution Prevention and Control, TPP Nikola Tesla (TPP Nikola Tesla A, TPP Nikola Tesla B, TPP Kolubara (Unit A5) and TPP Morava) should obtain an operation permit by 2015, while one of the conditions for obtaining of this permit is alignment of their operation with the requirements of legal regulations, related to the continuous emission measurements.

Between 2003–2007 during the ESP reconstruction, equipment for continuous air emission measurement of harmful and hazardous substances was installed at a number of TPPs, but some remained uncontrolled. This project is designed to address this lack.

In addition to this, NO<sub>x</sub> reduction system - primary measure of NO<sub>x</sub> emission reduction system would be carried out in the context of Serbian legislation. In accordance with the Law on Integrated Pollution Prevention and Control, TPP Kostolac B should obtain an operating permit by 2015; whereas one of the conditions for this is harmonisation of TPP plant operation with emission limit values (ELV) of harmful substances into air, and through that with emission limit values for sulphur oxides.

In case that this project is not implemented by 2015, PE EPS would not be able to meet the requirements of both Serbian and EU legislation.

### 3.2 Assessment of project impact, catalytic effect, sustainability and cross border impact (where applicable)

#### Impact

After the implementation of the project and introduction of NO<sub>x</sub> reduction system – primary measures of NO<sub>x</sub> emission reduction system at TPP Kostolac B, nitrogen oxides emission reduction will be from 345 - 470 mg/m<sup>3</sup> to 200 mg/m<sup>3</sup> which will have an impact on the air quality improvement around the TPP and also into the cross border context, reduction of soil and forestry contamination and reduction of the number of people suffering from respiratory illnesses in this area. In addition to this, analyzers for continuous dust emission measurement in flue gases after the new equipment for the needs of NO<sub>x</sub> reduction system – primary measures of NO<sub>x</sub> emission reduction system will be installed, enabling constant control of ESP operation.

This project will also enable continuous monitoring of emission of harmful substances from flue gases of the power plant of EPS, TPP Kostolac B, situated nearby the town of Pozarevac (about 50 000 inhabitants).

Quality emission monitoring would enable improvement of air quality around the TPP. The number of people suffering from respiratory illnesses, now increasing in this area, would be reduced. Harmful impact on soil would also be reduced around the facilities through constant control of operational efficiency of the plant after introduction of NO<sub>x</sub> reduction system – primary measures of NO<sub>x</sub> emission reduction system.

#### Catalytic effects

The health of the working and the youngest population will be improved, with all direct and indirect effects: reduction of health costs, both curative and preventive for all levels and age groups of population; increased efficiency of the working part of population; reduced pollution of agricultural surfaces; improved economy of the affected areas.

It is difficult to enforce environmental legislation in the private sector when the bulk of pollution is the responsibility of such a large public organisation as EPS. When EPS has cleaned up its operations, general enforcement will be easier to implement and better justified.

#### Sustainability

The Government Memorandum on budget for 2008 with projections for 2009 and 2010 shows that the Government commits itself to undertake gradual annual tariff adjustments in order to reach cost-recovering tariffs for electricity in compliance with European levels, thus allowing EPS to raise finance for investment in environmental projects. The current round of investment through donor financing should therefore represent a one-off improvement to bring the Serbian power generating capacity to a point where sustainable further development is possible without subsidy or further donor intervention.

Through adoption and approximation of Serbian legislation to the EU standards, far greater attention in future will be given to potentially hazardous substances, and avoiding a repeat of the present situation will become a mainstream task of energy producers and environmental agencies alike.

### 3.3 Results and measurable indicators

#### Component

A new equipment for the needs of NO<sub>x</sub> reduction system – primary measures of NO<sub>x</sub> emission reduction system procured and installed at TPP Kostolac B that will significantly reduce atmospheric pollution in the region.

Measurable indicators will be:

- Degree of compliance with a procurement and installation schedule to be developed with the tender documentation;
- Performance characteristics of the equipment and facilities provided by the supplier;
- National and EU standards concerning the quality of air;
- Number of operation staff trained.



### 3.4 Activities

#### Activities related to component

1. Manufacture and transport of equipment
2. Installation of equipment
3. Commissioning with all accompanying tests
4. Maintenance crew trained; training of EPS staff for supervision and continuous maintenance of equipment and facilities
5. Continuous operation of the facility and analysis of operation results.

All activities should be carried out in accordance with the latest domestic and EU legislation.

### 3.5 Contracting arrangements

#### Component

There will be one supply contract for equipment including works that will be carried out by the equipment suppliers. Supervision and testing will be carried out by the staff of EPS.

### 3.6 Conditionality and sequencing

It will be a condition that the technical specifications are prepared by the beneficiary. Implementation of the works must be overseen by a qualified supervising engineer. For operational reasons (the need to operate the power plants during the peak winter period) works on installation of equipment for the needs of NO<sub>x</sub> reduction system – primary measures of NO<sub>x</sub> emission reduction system must be undertaken during the planned plant shutdown periods.

### 3.7 Linked activities

Since 2000, EPS has taken a series of actions aimed at the improvement of operation of thermal units, as well as availability and reliability increase of units in operation.

By 2004, within the capital overhaul and regular overhauls, special attention was paid to the ESP, with the purpose to bring the existing ESP after ten-year operation to the maximum reliability level within the existing technologies. Since 2004, alignment of EPS operation with the legal regulations has been started.

Other projects were also launched related to environment

improvement around the TPP and on a broader level:

- Capital overhauls of units A3 TPP Nikola Tesla A, reconstruction of ESP (€64.5 m CARDS 2002)
- Study of pollution from thermal power stations in Serbia and on pollution mitigation measures and their costs (€0.75 m CARDS 2003)
- Reconstruction of Unit A1, A2, A4 and A5 ESPs, TPP Nikola Tesla A between 2004-2007 (€58 m)
- Reconstruction of Unit A2, ESPs, TPP Kostolac A, 2006 year, financed by EAR.
- Environmental clean up measures (based on the study undertaken under the 2003 programme) (Electrostatic precipitators at Kostolac A and ash transport and storage at Nikola Tesla B power plant (€35 m).
- Ash handling system reconstruction with the thick slurry system at TPP Nikola Tesla B, through which reduction of ash dispersion from the ash disposal will be achieved. Project implementation has been started in 2007, financed by EAR.
- Ash handling system reconstruction with the thick slurry system at TPP Kostolac B, through which reduction of ash dispersion from the ash disposal will be achieved. Project implementation has been started in 2007, financed by EBRD loan to EPS.

### 3.8 Lessons learned

Experience on reconstruction executed so far has shown that equipment delivery period from abroad was prolonged, having an impact on the completion of the planned reconstruction implemented during overhauls, whose beginning and duration period is limited during the year. This is the reason why the tenders for procurement and delivery of the equipment necessary for the reconstruction should be planned earlier, since equipment comes from abroad.

Participation of domestic firms in the reconstruction was assessed as positive and they have demonstrated their technical ability to carry out the reconstruction to the end.

## 4 INDICATIVE BUDGET (AMOUNTS IN M€)

Activities	TOTAL PUBLIC COST	SOURCES OF FUNDING										
		EU CONTRIBUTION				NATIONAL PUBLIC CONTRIBUTION						PRIVATE
		Total	% *	IB	INV	Total	Type of cofinancing (J/P) **	% *	Central	Regional	IFIs	
Activity 1												
contract 1.	12.00	9.00	75%		9.0	3.0	P	25%	3.0			
TOTAL	12.00	9.00	75%		9.0	3.0	P	25%	3.0			

Amounts net of VAT

\* expressed in % of the Total Public Cost

## 5 INDICATIVE IMPLEMENTATION SCHEDULE

Contracts	Start of Tendering	Signature of contract	Project Completion
Contract 1	T + 1Q	T + 4Q	T + 10Q

## 6 CROSS CUTTING ISSUES

### 6.1 Equal Opportunity

The beneficiary will make sure its objectives, policies and interventions have a positive impact on and are in line with the main principles of gender equality. It will ensure equal opportunities clauses in all tendering material for procurement of equipment.

### 6.2 Environment

The objective of this project is to help Serbia to achieve compliance with the Environmental Acquis, as required by the Energy Community Treaty. This project will thus directly involve mainstreaming of environmental issues.

### 6.3 Minorities

As minorities and other vulnerable groups are usually the first to suffer from environmental degradation, and have the least chance of protecting themselves (e.g. by choosing residences in non-polluted areas), this project will improve their conditions in terms of reduced health hazards.

## ANNEX 1: LOGICAL FRAMEWORK MATRIX

Project is proposed by the Ministry of Mining and Energy, with the main beneficiary being the Public Enterprise Electric Power Industry of Serbia. Total value of the project amounts to 12 million Euros, out of which 9.0 million euros is the proposed EU contribution and the remaining 3.0 million euros national co-financing. This project is the last phase of an integrated programme for upgrading of the facilities at TPP Kostolac B; this programme's objective is to rectify in a logical manner the legacy of many years of environmental degradation. Investment-technical documents for this project will be finalised in the end of 2009. The proposals that form the basis for this project have been scrutinised by the Ministry of Environmental Protection and Spatial Planning, an EIA will be conducted and approved and the various planning and construction permits will be obtained. The appropriate technological solution has been chosen and approved. The project's main objective is to reduce atmospheric pollution generated by TPP Kostolac B thus contributing to environmental harmonization and removal of serious health hazards by fulfilling the Directive 2001/80/EC for large combustion plants (modernizing specified Thermal Power Plants) and 96/62/EC. Project result includes procurement and installation equipment of NO<sub>x</sub> reduction system – primary measures of NO<sub>x</sub> emission reduction system at TPP Kostolac B.



LOGFRAME PLANNING MATRIX FOR PROJECT FICHE		Project Title: Environmental Protection at EPS - NO <sub>x</sub> reduction system – primary measures of NO <sub>x</sub> emission reduction system TPP KOSTOLAC B (unit B1 - B2)	
		Total budget: 12,000,000 Euro	IPA budget: 9,000,000 Euro
OVERALL OBJECTIVE	Objectively verifiable indicators	Sources of Verification	
To reduce the levels of atmospheric pollution generated from TPP Kostolac B, by installing equipment for the needs of NO <sub>x</sub> reduction system – primary measure of NO <sub>x</sub> emission reduction system thus contributing to environmental harmonisation and removal of serious health hazards	Serbian practice in line with the EU norms. Reduction of the level of nitrogen oxides in ambient air in the region surrounding the TPP Reduction of soil contamination Reduction of transboundary transport of nitrogen oxides and contamination Reduction of influence of acid rains soil contamination and forestry Reduction of incidence of diseases associated with environmental contaminants	EPS reports Annual report of Environmental Protection Agency on air quality within the impact zone Annual statistics report of the Ministry of Health on the number of people suffering from respiratory illnesses	
SPECIFIC PROJECT PURPOSE	Objectively verifiable indicators	Sources of Verification	Assumptions
To fulfill the Directive 2001/80/EC for large combustion plants by modernising TPP Kostolac B according to the EC Directive 96/62/EC	Consistency of emissions control at TPPs over a longer period State of EPS installations and surrounding environment in comparison with the EU norms. Air quality indicators improved to the level defined by EU standards	EPS / TPP technical reports Reports of the Serbian Environmental Protection Agency Annual Report on the State of Environmental Protection of the Electric Power Industry of Serbia Local and nation media reports	EU standards do not change while the project is being implemented.

RESULTS	Objectively verifiable indicators	Sources of Verification	Assumptions
A new equipment for the needs of NO <sub>x</sub> reduction system – primary measure of NO <sub>x</sub> emission reduction system procured and installed at TPP Kostolac B that will significantly reduce atmospheric pollution in the region.	<p>Degree of compliance with a procurement and installation schedule to be developed with the tender documentation.</p> <p>Performance characteristics of the equipment and facilities provided by the supplier</p> <p>National and EU standards concerning the quality of air</p> <p>Number of operation staff trained</p>	<p>Project reports</p> <p>Contract with the supplier</p> <p>Technical specification of the Supplier</p> <p>Reports of the Serbian Environmental Protection Agency</p> <p>Annual Report on the State of Environmental Protection of the Electric Power Industry of Serbia</p> <p>Issued certificates to the operational staff in TPP Kostolac B</p>	<p>Continued support by top management of EPS for issues of environmental protection.</p> <p>National Authorities committed to the fulfillment of EU standards in the environmental sector</p> <p>Political stability and continuation of harmonization process with EU</p>
ACTIVITIES	Means	Means & Costs	Assumptions
<p>Manufacture and transport of equipment</p> <p>Installation of equipment</p> <p>Commissioning with all accompanying tests</p> <p>Maintenance crew trained; training of EPS staff for supervision and continuous maintenance of equipment and facilities</p> <p>Continuous operation of the facility and analysis of operation results.</p>		<p>12 m€</p> <p>This project will be implemented through a ‘turnkey’ contract, according to FIDIC procedures to design, build and supervise the supply, commissioning and initial operation of new facilities and equipment with appropriate monitoring personnel supplied by EPS.</p>	<p>Competent and qualified consulting and engineering companies interested and available for the project</p> <p>Willingness of TPP Kostolac B staff to apply new production &amp; control technologies</p> <p>Equipments and the facilities available on the market</p>



## ANNEX 2: AMOUNTS (IN €) CONTRACTED AND DISBURSED BY QUARTER FOR THE PROJECT

(IPA contribution only)

Contracted	2009				2010				2011				Total
	QR1	QR2	QR3	QR4	QR1	QR2	QR3	QR4	QR1	QR2	QR3	QR4	
Contract				9.0 m€									9.0 m€
<b>Cumulated</b>				9.0 m€									9.0 m€
<b>Disbursed</b>													
Contract				4.5 m€							4.5 m€		9.0 m€
<b>Cumulated</b>				4.5 m€							4.5 m€		9.0 m€

## ANNEX 3: INSTITUTIONAL FRAMEWORK – LEGAL RESPONSIBILITIES AND STATUTES

Close cooperation of the PE EPS and the following institutions is necessary:

- Ministry of Mining and Energy;
- Ministry of Finance;
- Ministry of Environment and Spatial Planning;
- Municipalities and local communities on whose territory TPP is located.

## ANNEX 4: REFERENCE TO LAWS, REGULATIONS AND STRATEGIC DOCUMENTS

Reference list of relevant laws and regulations:

- Directive 2001/80/EC defining harmful substances emission limit values from large combustion plants;
- Directive 96/62/EC - framework, related to the quality of ambient air;
- Convention on Long-Distance Cross-Border Air Pollution;
- Contract on the Founding of SE Europe Energy Community, which came into force in July 2006, within which implementation of the Directive 2001/80/EC is planned;
- Law on Environmental Protection - Official Gazette RS № 135/04;
- Law on Integrated Pollution Prevention and Control - Official Gazette RS № 135/04;
- Draft Law on Air Protection;
- Energy Development Strategy by 2015 (Republic of Serbia);
- The Programme of Energy Development Strategy Implementation of the Republic of Serbia by 2015 for the period from 2007 and 2012;
- Sustainable Development Strategy of the Republic of Serbia
- National Environmental Programme of the Republic of Serbia (NEAP RS);
- Ratification Law of Kyoto Protocol on Long-Distance Cross-Border Air Pollution;

- Legal requirement concerning operation harmonisation of existing units with ELV requirements for air emission of harmful substances: Environmental Protection Law (Republic of Serbia) and the Law on Integrated Pollution Prevention and Control (Republic of Serbia);
- Orientation of the Electric Power Industry of Serbia towards the fulfillment of all EU norms and standards from the subject field;
- Framework Plan of the Electric Power Industry of Serbia for the Reduction of Harmful Substances Emission from EPS TPPs considered within the Study: 'Emission Control from Coal-Fired TPPs of Electric Power Industry of Serbia', financed by the European Agency for Reconstruction during 2003. The Plan was developed in cooperation with EPS, Ministry of Mining and Energy and Ministry of the Protection of Natural Resources and Environmental Protection of the Republic of Serbia.

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## ANNEX 5: DETAILS PER EU-FUNDED CONTRACT (\*) WHERE APPLICABLE

### Component

A new equipment for the NO<sub>x</sub> reduction system – primary measures of NO<sub>x</sub> emission reduction system procured and installed at TPP Kostolac B, with output of nitrogen oxides concentration of 200 mg/m<sup>3</sup>.

Measuring equipment for continuous emission measurement of harmful and hazardous substance on thermal power plants to measure:

- emission parameters: SO<sub>2</sub>, NO<sub>x</sub> (reduced to NO<sub>2</sub>), CO, CO<sub>2</sub>, dust,
- operation parameters: temperature, oxygen.



## **SUMMARY PROJECT FICHE**

# **TPP NIKOLA TESLA A (UNIT A3 - A6) FLUE GAS DESULPHURISATION PLANT**



# STANDARD SUMMARY PROJECT FICHE

## – IPA DECENTRALISED NATIONAL PROGRAMMES

### 1 BASIC INFORMATION

#### 1.1 CRIS Number

EC to complete

#### 1.2 Title

Environmental Protection at EPS - (FLUE GAS DESULPHURISATION PLANT AT TPP NIKOLA TESLA A3 - A6)

#### 1.3 ELARG statistical code

EC to complete

#### 1.4 Location

Republic of Serbia

### Implementing arrangements

#### 1.5 Contracting Authority (EC)

EC Delegation in Serbia

#### 1.6 Implementing Agency

EC Delegation in Serbia

#### 1.7 Beneficiary (including details of project manager)

The SPO will be Assistant Minister Predrag Sekeljic, Ministry of Mining and Energy

Responsible for the management of the project: Mihajlo Gavrić - EPS, Manager of the Environmental Protection Sector, Electric Power Industry of Serbia - EPS

A Steering Committee will be formed consisting of approximately 6 members. It will be chaired by the SPO and it will include representatives of the EC Delegation and other stakeholders such as the Ministry of Mining and Energy, the Ministry of Environment, the Ministry of Finance etc.

#### 1.8 Overall cost

200,000,000 Euro

#### 1.9 EU contribution

150,000,000 Euro

#### 1.10 Final date for contracting

Dec 2011 (n + 3)

#### 1.11 Final date for execution of contracts

Dec 2013 (n + 3 + 2)

#### 1.12 Final date for disbursements

Dec 2014 (n + 3 + 2 + 1)

### 2 OVERALL OBJECTIVE AND PROJECT PURPOSE

#### 2.1 Overall Objective

To reduce the levels of atmospheric pollution generated from TPP Nikola Tesla A, by installing an FGD plant thus contributing to environmental harmonisation and removal of serious health hazards.

#### 2.2 Project purpose

To fulfill the Directive 2001/80/EC for large combustion plants by modernising TPP Nikola Tesla A according to the EC Directive 96/62/EC.

#### 2.3 Link with AP/NPAA / EP/ SAA

AP and NPAA are not applicable

The Plan for Implementation of the European Partnership Priorities has listed detailed task with regards to the Environment and Energy sector – 7.3.2 - to begin implementation of the national environmental strategy, 7.3.5 - to implement adopted legislation on industrial pollution, 7.3.12 – to continue to implement the national environment protection strategy, 7.5.1 to implement the Commitments undertaken within the framework of the Energy Community Treaty.

Commission working document “Serbia 2007 Progress Report” as of 6.11.2007 (SEC(2007) 1435), regarding the Stabilisation and Association Agreement and the European Partnership priorities, where on page 34 stands “Limited progress has been made in implementing legislation on industrial pollution control and risk management. Work on plans to achieve compliance of existing installations with the legal requirements has been initiated, on pilot project basis”.

Under the European Partnership Serbia is committed to “establish an independent Energy Regulatory Agency and carry out environmental audits on energy plants and address worst polluters.”(p. 12). Under Article 111 (Environment) of the SAA, Serbia is obliged to halt further degradation and start improving the environmental situation with the aim of sustainable development. Stockholm Convention;

This project is strongly linked with the quoted documents, tasks and expectations.

The Energy Community Treaty signed multilaterally by the EU Commission and Balkan countries introduces the legal requirement for Serbia to implement the Acquis on the Environment. Annex II of the Treaty sets the deadline of 31 December 2017 for implementation of the Directive 2001/80/EC (the ‘large power plant’ Directive) and Directive 96/59/EC, which is a relatively short period for such a major programme of works, and with such a high cost.

Under the European Partnership Serbia is committed to “establish an independent Energy Regulatory Agency and carry out environmental audits on energy plants and address the worst polluters.” (p. 12).

Under Article 111 (Environment) of the SAA, Serbia is obliged to halt further degradation and start improving the environmental situation with the aim of sustainable development. ...Cooperation could also centre on the development of strategies to significantly reduce local, regional and trans-boundary air and water pollution, to establish a system for efficient, clean, sustainable and renewable production and consumption of energy. (p59).

## 2.4 Link with MIPD

Energy: Compliance support to meet the needs of the Regional Energy Treaty, relevant Community Directives and regional market obligations; compliance of legislation with the acquis. (p. 23)

Environment: Support to the approximation and implementation of Environmental legislation and related strategies... (p. 22)

The benefit from this project will be the implementation of the EU Directives 2001/80/EC for large combustion plants.

## 2.5 Link with National Development Plan (where applicable)

n/a

## 2.6 Link with national / sectoral plans

The project is in accordance with all of the following strategic documents:

- Sustainable Development Strategy of the Republic of Serbia
- The Programme of Energy Development Strategy Implementation of the Republic of Serbia by 2015 for the period from 2007 to 2015
- National Environmental Programme of the Republic of Serbia (NEAP RS)
- The Framework Plan of the Electric Power Industry of Serbia for the Reduction of Harmful Substances Emission from EPS TPPs considered within the Study: ‘Emission Control from Coal-Fired TPPs of Electric Power Industry of Serbia’, was financed by the European Agency for Reconstruction during 2003. The Plan was developed in cooperation with EPS, Ministry of Mining and Energy and Ministry of the Protection of Natural Resources and Environmental Protection of the Republic of Serbia.
- The Pre-feasibility Study for Emission Control for Coal-Fired Power Plants, financed for EAR during 2003 by RWE Innogy, established the priority facilities for harmful substance emission alignment from EPS TPPs.
- The new Serbian Environmental Protection Law anticipates continuous control of air emission of harmful substances for all TPPs.

- Sustainable development and environmental management measures were planned for the next ten years for the Republic of Serbia within the National Environmental Program of the Republic of Serbia (NEAP RS – Draft) adopted in accordance with the Environmental Protection Law (Official Gazette RS № 135/04).

The proposed project is in the field of air quality protection, one of the first priorities which is one part of the restructuring of environmental protection in EPS, and represents some 70% of the problem of environmental protection in the Republic of Serbia.

## 3 DESCRIPTION OF PROJECT

### 3.1 Background and justification

During the last decade of the twentieth century, Serbia had many problems such as social-economic setbacks, isolation and a difficult inheritance which resulted in Serbia neglecting environmental issues. As the country emerges from this period, fresh attention is being given to the environment so that technical and energy-related development assumes a cleaner nature than hitherto. The Electric Power Industry of Serbia (EPS) with its activities - starting from natural resources, coal and hydro potential to the generation, transmission and distribution of electricity - has a great impact on the natural state of environment. Thermal power facilities are without a doubt the biggest polluters of air, compared to other plants and facilities within EPS. In accordance with the Serbian policy of association and harmonisation with the EU and its standards, the Electric Power Industry of Serbia decided to give first priority to respecting the EU environmental standards.

#### *Flue gases from TPPs*

During the construction of the existing TPPs, there were no legal regulations concerning emission limits at the republic level, so no measures were taken to reduce sulphur and nitrogen oxide emission into the atmosphere. Measures taken to reduce dust emission do not meet the current emission requirements and limits, both of the domestic and EU regulations. Emission alignment of these facilities with the requirements of the EU regulations is required in the forthcoming period.

Measuring equipment for continuous emission measurement was not installed in thermal power plants - concentration level of dust and gases (SO<sub>2</sub>, NO<sub>x</sub>, CO, CO<sub>2</sub>) in flue gases. Emission control is carried out once a year by the authorised institution.

Equipment for dust treatment of flue gases - electrostatic precipitators (ESP) - was installed in Nikola Tesla A Thermal Power Plant as an air protection measure when it was constructed in 1976-1979 without desulphurisation and denitrification of flue gases. Flue gases of this unit are emitted into the atmosphere over a stack with the height H=150 m (unit A3) and stack with the height H=220 m (unit A4, A5, A6), therefore the operating state of the electrostatic precipitator has a direct impact on air pollution of the immediate environment.



After about 28 years of operation, the large scale emissions from the thermal power plant due to the lack of effective ESPs leads in particular to significant deposits of heavy particles and emissions of sulphur and nitrogen oxides in the surrounding areas which experience a high incidence of respiratory illnesses, particularly among children and acid rains in transboundary context. This pollution also causes damage to crops, agricultural products and forestry. Power station plumes can travel considerable distances with little dilution.

Since 2000, EPS has taken a series of actions aimed at improvement of the operation of thermal units, as well

as increase of the availability and reliability of units in operation. By 2004, within the capital overhaul and regular overhauls, special attention was paid to the ESP, with the purpose of bringing the existing ESP after ten-year operation to the maximum reliability level within the existing technologies, FGD, DENOX existing technologies and reconstruction of ash handling systems in EPS TPPs.

Since 2004, alignment of EPS operation with the legal regulations has been started. Other projects were also launched related to environmental improvement around the TPP and on a broader level. Performed reconstructions at EPS TPPs in the period between 2004 and 2007 include:

### Electrostatic precipitators of fly gases

Replacement of the existing ESPs with new ones:

TPP	Unit	Year of reconstruction	Financing
Nikola Tesla A	A1, A2, A4, A5, A6	2004 - 2010	EU (EAR, IPA), SEPF, EPS
Nikola Tesla B	B1, B2	2009 - 2010 (expected)	EU (IPA)
Kolubara A	A5	2009	SEPF
Morava (Svilajnac)	A	2010	EU (IPA)
Kostolac A	A1, A2	2004 - 2006	EU (EAR), EPS
Kostolac B	B1, B2	2009 - 2011 (expected)	SEPF, EPS

ESP reconstruction of Units are based on the EAR's Feasibility Study of 2003.

### Ash handling systems

Replacement of the existing Ash handling systems ESPs with new ones:

TPP	Year of reconstruction	Cost (mil. €)	Financing
Nikola Tesla A	2010 - 2012 (expected)	40.0	EU IPA)
Nikola Tesla B	2007 - 2009	35.0	EU (EAR)
Kolubara A	2008 - 2009	5.0	SEPF
Morava (Svilajnac)	2010	4.0	EPS
Kostolac A	2009 - 2010	13.0	KfW loan - EPS
Kostolac B	2007 - 2009 (expected)	17.0	EBRD loan - EPS

### Flue gas desulphurisation plants

Building of new ones:

TPP	Planned Year	Cost (mil. €)	Financing
Nikola Tesla A	2012 - 2015	170.0	EPS
Nikola Tesla B	2010 - 2013 (expected)	210.0	EU (IPA), EPS
Kostolac B	2009 - 2011 (expected)	125.0	SEPF, NIP, EPS

Legend :

- EU - European Union
- SEPF - Serbian Environmental Protection Fond
- NIP - National Investment Fond
- EPS - Electric Power Industry of Serbia

By aligning electrostatic precipitator operation with requirements of the EU regulations for dust emission reduction, the total dust emission from TPP Nikola Tesla A and TPP Nikola Tesla B, after performed ESP reconstruction on TPP Nikola Tesla A - Units 1, A2, A3, A4 and A5, was reduced by 88%; while the total dust emission at TPP Kostolac A and TPP Kostolac B was reduced after ESP reconstruction on Units A1 and A2 by 54%.

Pursuant to the Law on Integrated Pollution Prevention and Control, TPP Nikola Tesla (TPP Nikola Tesla A, TPP Nikola Tesla B, TPP Kolubara (Unit A5) and TPP Morava) should obtain an operation permit by 2015, while one of the conditions for obtaining of this permit is alignment of their operation with the requirements of legal regulations, related to the continuous emission measurements.

Between 2003–2007 during the ESP reconstruction, equipment for continuous air emission measurement of harmful and hazardous substances was installed at a number of TPPs, but some remained uncontrolled. This project is designed to address this lack.

The project would be implemented in the context of the previous experience in the settlement of this issue reflected through the implementation of Studies, Programmes and Plans implemented so far:

- Implementation of the STUDY – *Directions for Optimal Sulphur Oxides Emission Reduction from EPS TPPs* considering technical solutions for sulphur oxides emission reduction from existing facilities and supplying the proposal of FGD plant introduction according to facilities, as well as implementation schedule with necessary funds;
- PROJECT - *Development of Investments – Technical Documents of FGD Plant at TPP Kostolac B*;
- *Mid-term Environmental Protection Development Plan, representing an integral part of Mid-Term Business Plan for the Period 2008 – 2015*, considering the cost schedule for sulphur oxides emission reduction, i.e. introduction of flue gas desulphurisation plants.

In addition to this, installation of FGD plants would be carried out in the context of Serbian legislation. In accordance with the Law on Integrated Pollution Prevention and Control, TPP Nikola Tesla A should obtain an operating permit by 2015; whereas one of the conditions for this is harmonisation of FGD plant operation with emission limit values (ELV) of harmful substances into air, and through that with emission limit values for sulphur oxides.

In case that this project is not implemented by 2015, PE EPS would not be able to meet the requirements of both Serbian and EU legislation.

### 3.2 Assessment of project impact, catalytic effect, sustainability and cross border impact (where applicable)

#### Impact

After the implementation of the project and construction of FGD plant at TPP Nikola Tesla A with necessary ancillary facilities, sulphur oxides emission reduction will

be from 1200 – 3000 mg/m<sup>3</sup> to 400 mg/m<sup>3</sup>, which will have an impact on the air quality improvement around the TPP and also into the cross border context, reduction of soil and forestry contamination and reduction of the number of people suffering from respiratory illnesses in this area. In addition to this, analyzers for continuous dust emission measurement in flue gases after the FGD will be installed, enabling constant control of ESP operation.

This project will also enable continuous monitoring of emission of harmful substances from flue gases of the power plant of EPS, TPP Nikola Tesla A, situated nearby the town of Obrenovac (about 30 000 inhabitants), and 40 km away from Belgrade.

Quality emission monitoring would enable improvement of air quality around the TPP. The number of people suffering from respiratory illnesses, now increasing in this area, would be reduced. Harmful impact on soil would also be reduced around the facilities through constant control of operational efficiency of installed FGD plant.

#### Catalytic effects

The health of the working and the youngest population will be improved, with all direct and indirect effects: reduction of health costs, both curative and preventive for all levels and age groups of population; increased efficiency of the working part of population; reduced pollution of agricultural surfaces; improved economy of the affected areas.

It is difficult to enforce environmental legislation in the private sector when the bulk of pollution is the responsibility of such a large public organisation as EPS. When EPS has cleaned up its operations, general enforcement will be easier to implement and better justified.

#### Sustainability

The Government Memorandum on budget for 2008 with projections for 2009 and 2010 shows that the Government commits itself to undertake gradual annual tariff adjustments in order to reach cost-recovering tariffs for electricity in compliance with European levels, thus allowing EPS to raise finance for investment in environmental projects. The current round of investment through donor financing should therefore represent a one-off improvement to bring the Serbian power generating capacity to a point where sustainable further development is possible without subsidy or further donor intervention.

Through adoption and approximation of Serbian legislation to the EU standards, far greater attention in future will be given to potentially hazardous substances, and avoiding a repeat of the present situation will become a mainstream task of energy producers and environmental agencies alike.

### 3.3 Results and measurable indicators

#### Component

A new FGD plant procured and installed at TPP Nikola Tesla A that will significantly reduce atmospheric pollution in the region.

Measurable indicators will be:

- Degree of compliance with a procurement and installation schedule to be developed with the tender documentation;



- Performance characteristics of the equipment and facilities provided by the supplier;
- National and EU standards concerning the quality of air;
- Number of operation staff trained.

### 3.4 Activities

#### Activities related to component

1. Manufacture and transport of equipment
2. Installation of equipment
3. Commissioning with all accompanying tests
4. Maintenance crew trained; training of EPS staff for supervision and continuous maintenance of equipment and facilities
5. Continuous operation of the facility and analysis of operation results.

All activities should be carried out in accordance with the latest domestic and EU legislation.

### 3.5 Contracting arrangements

#### Component

There will be one supply contract for equipment including works that will be carried out by the equipment suppliers. Supervision and testing will be carried out by the staff of EPS.

### 3.6 Conditionality and sequencing

It will be a condition that the technical specifications are prepared by the beneficiary. Implementation of the works must be overseen by a qualified supervising engineer. For operational reasons (the need to operate the power plants during the peak winter period) works on installation of equipment the FGD plant must be undertaken during the planned plant shutdown periods.

### 3.7 Linked activities

Since 2000, EPS has taken a series of actions aimed at the improvement of operation of thermal units, as well as availability and reliability increase of units in operation.

By 2004, within the capital overhaul and regular overhauls, special attention was paid to the ESP, with the purpose to bring the existing ESP after ten-year operation to the

maximum reliability level within the existing technologies. Since 2004, alignment of EPS operation with the legal regulations has been started.

Other projects were also launched related to environment improvement around the TPP and on a broader level:

- Capital overhauls of units A3 TPP Nikola Tesla A, reconstruction of ESP (€64.5 m CARDS 2002)
- Study of pollution from thermal power stations in Serbia and on pollution mitigation measures and their costs (€0.75 m CARDS 2003)
- Reconstruction of Unit A1, A2, A4 and A5 ESPs, TPP Nikola Tesla A between 2004-2007 (€58 m)
- Reconstruction of Unit A2, ESPs, TPP Kostolac A, 2006 year, financed by EAR.
- Environmental clean up measures (based on the study undertaken under the 2003 programme) (Electrostatic precipitators at Kostolac A and ash transport and storage at Nikola Tesla B power plant (€35 m).
- Ash handling system reconstruction with the thick slurry system at TPP Nikola Tesla B, through which reduction of ash dispersion from the ash disposal will be achieved. Project implementation has been started in 2007, financed by EAR.
- Ash handling system reconstruction with the thick slurry system at TPP Kostolac B, through which reduction of ash dispersion from the ash disposal will be achieved. Project implementation has been started in 2007, financed by EBRD loan to EPS.

### 3.8 Lessons learned

Experience on reconstruction executed so far has shown that equipment delivery period from abroad was prolonged, having an impact on the completion of the planned reconstruction implemented during overhauls, whose beginning and duration period is limited during the year. This is the reason why the tenders for procurement and delivery of the equipment necessary for the reconstruction should be planned earlier, since equipment comes from abroad.

Participation of domestic firms in the reconstruction was assessed as positive and they have demonstrated their technical ability to carry out the reconstruction to the end.

## 4 INDICATIVE BUDGET (AMOUNTS IN M€)

Activities	TOTAL PUBLIC COST	SOURCES OF FUNDING										
		EU CONTRIBUTION				NATIONAL PUBLIC CONTRIBUTION						PRIVATE
		Total	% *	IB	INV	Total	Type of cofinancing (J/P)**	% *	Central	Regional	IFIs	
Activity 1												
contract 1.	200.00	150.00	75%		150.00	50.00	P	25%	50.00			
TOTAL	200.00	150.00	75%		150.00	50.00	P	25%	50.00			

Amounts net of VAT

\* expressed in % of the Total Public Cost

## 5 INDICATIVE IMPLEMENTATION SCHEDULE

Contracts	Start of Tendering	Signature of contract	Project Completion
Contract 1	T + 1Q	T + 4Q	T + 10Q

## 6 CROSS CUTTING ISSUES

### 6.1 Equal Opportunity

The beneficiary will make sure its objectives, policies and interventions have a positive impact on and are in line with the main principles of gender equality. It will ensure equal opportunities clauses in all tendering material for procurement of equipment.

### 6.2 Environment

The objective of this project is to help Serbia to achieve compliance with the Environmental Acquis, as required by the Energy Community Treaty. This project will thus directly involve mainstreaming of environmental issues.

### 6.3 Minorities

As minorities and other vulnerable groups are usually the first to suffer from environmental degradation, and have the least chance of protecting themselves (e.g. by choosing residences in non-polluted areas), this project will improve their conditions in terms of reduced health hazards.

## ANNEX 1: LOGICAL FRAMEWORK MATRIX

Project is proposed by the Ministry of Mining and Energy, with the main beneficiary being the Public Enterprise Electric Power Industry of Serbia. Total value of the project amounts to 200 million euros, out of which 150.0 million euros is the proposed EU contribution and the remaining 50 million euros the national co-financing. This project is the last phase of an integrated programme for upgrading of the facilities at TPP Nikola Tesla A - unit A3 - A6 this programme's objective is to rectify in a logical manner the legacy of many years of environmental degradation. Investment-technical documents for this project will be finalised in the end of 2010. The proposals that form the basis for this project have been scrutinised by the Ministry of Environmental Protection and Spatial Planning, an EIA will be conducted and approved and the various planning and construction permits will be obtained. The appropriate technological solution has been chosen and approved. The project's main objective is to reduce atmospheric pollution generated by TPP Nikola Tesla A thus contributing to environmental harmonization and removal of serious health hazards by fulfilling the Directive 2001/80/EC for large combustion plants (modernizing specified Thermal Power Plants) and 96/62/EC. Project result includes procurement and installation of the flue gas desulphurisation plant at TPP Nikola Tesla A - unit A3 - A6.



LOGFRAME PLANNING MATRIX FOR PROJECT FICHE		Project Title: Environmental Protection at EPS - (flue gas desulphurisation plant at TPP Nikola Tesla A (unit A3 - A6))	
		Total budget: 200,000,000 Euro	IPA budget: 150,000,000 Euro
OVERALL OBJECTIVE	Objectively verifiable indicators	Sources of Verification	
To reduce the levels of atmospheric pollution generated from TPP Nikola Tesla A, by installing an FGD plant thus contributing to environmental harmonisation and removal of serious health hazards	Serbian practice in line with the EU norms. Reduction of the level of sulphur-oxides in ambient air in the region surrounding the TPP Reduction of soil contamination Reduction of transboundary transport of sulphur oxides and contamination Reduction of influence of acid rains soil contamination and forestry Reduction of incidence of diseases associated with environmental contaminants	EPS reports Annual report of Environmental Protection Agency on air quality within the impact zone Annual statistics report of the Ministry of Health on the number of people suffering from respiratory illnesses	
SPECIFIC PROJECT PURPOSE	Objectively verifiable indicators	Sources of Verification	Assumptions
To fulfill the Directive 2001/80/EC for large combustion plants by modernising TPP Nikola Tesla A according to the EC Directive 96/62/EC	Consistency of emissions control at TPPs over a longer period State of EPS installations and surrounding environment in comparison with the EU norms. Air quality indicators improved to the level defined by the EU standards	EPS / TPP technical reports Reports of the Serbian Environmental Protection Agency Annual Report on the State of Environmental Protection of the Electric Power Industry of Serbia Local and nation media reports	EU standards do not change while the project is being implemented.

RESULTS	Objectively verifiable indicators	Sources of Verification	Assumptions
A new FGD plant procured and installed at TPP Nikola Tesla A that will significantly reduce atmospheric pollution in the region.	<p>Degree of compliance with a procurement and installation schedule to be developed with the tender documentation.</p> <p>Performance characteristics of the equipment and facilities provided by the supplier</p> <p>National and EU standards concerning the quality of air</p> <p>Number of operation staff trained</p>	<p>Project reports</p> <p>Contract with the supplier</p> <p>Technical specification of the Supplier</p> <p>Reports of the Serbian Environmental Protection Agency</p> <p>Annual Report on the State of Environmental Protection of the Electric Power Industry of Serbia</p> <p>Issued certificates to the operational staff in TPP Nikola Tesla A</p>	<p>Continued support by top management of EPS for issues of environmental protection.</p> <p>National Authorities committed to the fulfillment of EU standards in the environmental sector</p> <p>Political stability and continuation of harmonization process with EU</p>
ACTIVITIES	Means	Means & Costs	Assumptions
<p>Manufacture and transport of equipment</p> <p>Installation of equipment</p> <p>Commissioning with all accompanying tests</p> <p>Maintenance crew trained; training of EPS staff for supervision and continuous maintenance of equipment and facilities</p> <p>Continuous operation of the facility and analysis of operation results.</p>		<p>200 m€</p> <p>This project will be implemented through a 'turnkey' contract, according to FIDIC procedures to design, build and supervise the supply, commissioning and initial operation of new facilities and equipment with appropriate monitoring personnel supplied by EPS.</p>	<p>Competent and qualified consulting and engineering companies interested and available for the project</p> <p>Willingness of TPP Nikola Tesla A staff to apply new production &amp; control technologies</p> <p>Equipments and the facilities available on the market</p>



## ANNEX 2: AMOUNTS (IN €) CONTRACTED AND DISBURSED BY QUARTER FOR THE PROJECT

(IPA contribution only)

Contracted	2009				2010				2011				Total
	QR1	QR2	QR3	QR4	QR1	QR2	QR3	QR4	QR1	QR2	QR3	QR4	
Contract				150.0 m€									150.0 m€
<b>Cumulated</b>				150.0 m€									150.0 m€
<b>Disbursed</b>													
Contract				75.0 m€							75.0 m€		150.0 m€
<b>Cumulated</b>				75.0 m€							75.0 m€		150.0 m€

## ANNEX 3: INSTITUTIONAL FRAMEWORK – LEGAL RESPONSIBILITIES AND STATUTES

Close cooperation of the PE EPS and the following institutions is necessary:

- Ministry of Mining and Energy;
- Ministry of Finance;
- Ministry of Environment and Spatial Planning;
- Municipalities and local communities on whose territory TPP is located.

## ANNEX 4: REFERENCE TO LAWS, REGULATIONS AND STRATEGIC DOCUMENTS

Reference list of relevant laws and regulations:

- Directive 2001/80/EC defining harmful substances emission limit values from large combustion plants;
- Directive 96/62/EC - framework, related to the quality of ambient air;
- Convention on Long-Distance Cross-Border Air Pollution;
- Contract on the Founding of SE Europe Energy Community, which came into force in July 2006, within which implementation of the Directive 2001/80/EC is planned;
- Law on Environmental Protection - Official Gazette RS № 135/04;
- Law on Integrated Pollution Prevention and Control - Official Gazette RS № 135/04;
- Draft Law on Air Protection;
- Energy Development Strategy by 2015 (Republic of Serbia);
- The Programme of Energy Development Strategy Implementation of the Republic of Serbia by 2015 for the period from 2007 and 2012;
- Sustainable Development Strategy of the Republic of Serbia
- National Environmental Programme of the Republic of Serbia (NEAP RS);
- Ratification Law of Kyoto Protocol on Long-Distance Cross-Border Air Pollution;

- Legal requirement concerning operation harmonisation of existing units with ELV requirements for air emission of harmful substances: Environmental Protection Law (Republic of Serbia) and the Law on Integrated Pollution Prevention and Control (Republic of Serbia);
- Orientation of the Electric Power Industry of Serbia towards the fulfillment of all EU norms and standards from the subject field;
- Framework Plan of the Electric Power Industry of Serbia for the Reduction of Harmful Substances Emission from EPS TPPs considered within the Study: 'Emission Control from Coal-Fired TPPs of Electric Power Industry of Serbia', financed by the European Agency for Reconstruction during 2003. The Plan was developed in cooperation with EPS, Ministry of Mining and Energy and Ministry of the Protection of Natural Resources and Environmental Protection of the Republic of Serbia.

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## ANNEX 5: DETAILS PER EU-FUNDED CONTRACT (\*) WHERE APPLICABLE

### Component

A new FGD plant procured and installed at TPP Nikola Tesla A - unit A3 - A6, with output of sulphur oxides concentration of 400 mg/m<sup>3</sup>.

Measuring equipment for continuous emission measurement of harmful and hazardous substance on thermal power plants to measure:

- emission parameters: SO<sub>2</sub>, NO<sub>x</sub> (reduced to NO<sub>2</sub>), CO, CO<sub>2</sub>, dust,
- operation parameters: temperature, oxygen.



## **SUMMARY PROJECT FICHE**

# **TPP NIKOLA TESLA B (UNIT B1 – B2) FLUE GAS DESULPHURISATION PLANT**



# STANDARD SUMMARY PROJECT FICHE

## – IPA DECENTRALISED NATIONAL PROGRAMMES

### 1 BASIC INFORMATION

#### 1.1 CRIS Number

EC to complete

#### 1.2 Title

Environmental Protection at EPS - (FLUE GAS DESULPHURISATION PLANT AT TPP NIKOLA TESLA B)

#### 1.3 ELARG statistical code

EC to complete

#### 1.4 Location

Republic of Serbia

### Implementing arrangements

#### 1.5 Contracting Authority (EC)

EC Delegation in Serbia

#### 1.6 Implementing Agency

EC Delegation in Serbia

#### 1.7 Beneficiary (including details of project manager)

The SPO will be Assistant Minister Predrag Sekeljic, Ministry of Mining and Energy

Responsible for the management of the project: Mihajlo Gavrić – EPS, Manager of the Environmental Protection Sector, Electric Power Industry of Serbia – EPS

A Steering Committee will be formed consisting of approximately 6 members. It will be chaired by the SPO and it will include representatives of the EC Delegation and other stakeholders such as the Ministry of Mining and Energy, the Ministry of Environment, the Ministry of Finance etc.

#### 1.8 Overall cost

210,000,000 Euro

#### 1.9 EU contribution

157,500,000 Euro

#### 1.10 Final date for contracting

Dec 2011 (n + 3)

#### 1.11 Final date for execution of contracts

Dec 2013 (n + 3 + 2)

#### 1.12 Final date for disbursements

Dec 2014 (n + 3 + 2 + 1)

### 2 OVERALL OBJECTIVE AND PROJECT PURPOSE

#### 2.1 Overall Objective

To reduce the levels of atmospheric pollution generated from TPP Nikola Tesla B, by installing an FGD plant thus contributing to environmental harmonisation and removal of serious health hazards.

#### 2.2 Project purpose

To fulfill the Directive 2001/80/EC for large combustion plants by modernising TPP Nikola Tesla B according to the EC Directive 96/62/EC.

#### 2.3 Link with AP/NPAA / EP/ SAA

AP and NPAA are not applicable

The Plan for Implementation of the European Partnership Priorities has listed detailed task with regards to the Environment and Energy sector – 7.3.2 - to begin implementation of the national environmental strategy, 7.3.5 - to implement adopted legislation on industrial pollution, 7.3.12 – to continue to implement the national environment protection strategy, 7.5.1 to implement the Commitments undertaken within the framework of the Energy Community Treaty.

Commission working document “Serbia 2007 Progress Report” as of 6.11.2007 (SEC(2007) 1435), regarding the Stabilisation and Association Agreement and the European Partnership priorities, where on page 34 stands “Limited progress has been made in implementing legislation on industrial pollution control and risk management. Work on plans to achieve compliance of existing installations with the legal requirements has been initiated, on pilot project basis”.

Under the European Partnership Serbia is committed to “establish an independent Energy Regulatory Agency and carry out environmental audits on energy plants and address worst polluters.”(p. 12). Under Article 111 (Environment) of the SAA, Serbia is obliged to halt further degradation and start improving the environmental situation with the aim of sustainable development. Stockholm Convention;

This project is strongly linked with the quoted documents, tasks and expectations.

The Energy Community Treaty signed multilaterally by the EU Commission and Balkan countries introduces the legal requirement for Serbia to implement the Acquis on the Environment. Annex II of the Treaty sets the deadline of 31 December 2017 for implementation of the Directive 2001/80/EC (the ‘large power plant’ Directive) and Directive 96/59/EC, which is a relatively short period for such a major programme of works, and with such a high cost.

Under the European Partnership Serbia is committed to “establish an independent Energy Regulatory Agency and carry out environmental audits on energy plants and address the worst polluters.” (p. 12).

Under Article 111 (Environment) of the SAA, Serbia is obliged to halt further degradation and start improving the environmental situation with the aim of sustainable development. ...Cooperation could also centre on the development of strategies to significantly reduce local, regional and trans-boundary air and water pollution, to establish a system for efficient, clean, sustainable and renewable production and consumption of energy. (p59).

### 2.3 Link with MIPD

Energy: Compliance support to meet the needs of the Regional Energy Treaty, relevant Community Directives and regional market obligations; compliance of legislation with the acquis. (p. 23)

Environment: Support to the approximation and implementation of Environmental legislation and related strategies... (p. 22).

The benefit from this project will be the implementation of the EU Directives 2001/80/EC for large combustion plants.

### 2.4 Link with National Development Plan (where applicable)

n/a

### 2.5 Link with national / sectoral plans

The project is in accordance with all of the following strategic documents:

- Sustainable Development Strategy of the Republic of Serbia
- The Programme of Energy Development Strategy Implementation of the Republic of Serbia by 2015 for the period from 2007 to 2015
- National Environmental Programme of the Republic of Serbia (NEAP RS)
- The Framework Plan of the Electric Power Industry of Serbia for the Reduction of Harmful Substances Emission from EPS TPPs considered within the Study: ‘Emission Control from Coal-Fired TPPs of Electric Power Industry of Serbia’, was financed by the European Agency for Reconstruction during 2003. The Plan was developed in cooperation with EPS, Ministry of Mining and Energy and Ministry of the Protection of Natural Resources and Environmental Protection of the Republic of Serbia.
- The Pre-feasibility Study for Emission Control for Coal-Fired Power Plants, financed for EAR during 2003 by RWE Innogy, established the priority facilities for harmful substance emission alignment from EPS TPPs.
- The new Serbian Environmental Protection Law anticipates continuous control of air emission of harmful substances for all TPPs.

- Sustainable development and environmental management measures were planned for the next ten years for the Republic of Serbia within the National Environmental Program of the Republic of Serbia (NEAP RS – Draft) adopted in accordance with the Environmental Protection Law (Official Gazette RS № 135/04).

The proposed project is in the field of air quality protection, one of the first priorities which is one part of the restructuring of environmental protection in EPS, and represents some 70% of the problem of environmental protection in the Republic of Serbia.

## 3 DESCRIPTION OF PROJECT

### 3.1 Background and justification

During the last decade of the twentieth century, Serbia had many problems such as social-economic setbacks, isolation and a difficult inheritance which resulted in Serbia neglecting environmental issues. As the country emerges from this period, fresh attention is being given to the environment so that technical and energy-related development assumes a cleaner nature than hitherto. The Electric Power Industry of Serbia (EPS) with its activities - starting from natural resources, coal and hydro potential to the generation, transmission and distribution of electricity - has a great impact on the natural state of environment. Thermal power facilities are without a doubt the biggest polluters of air, compared to other plants and facilities within EPS. In accordance with the Serbian policy of association and harmonisation with the EU and its standards, the Electric Power Industry of Serbia decided to give first priority to respecting the EU environmental standards.

#### *Flue gases from TPPs*

During the construction of the existing TPPs, there were no legal regulations concerning emission limits at the republic level, so no measures were taken to reduce sulphur and nitrogen oxide emission into the atmosphere. Measures taken to reduce dust emission do not meet the current emission requirements and limits, both of the domestic and EU regulations. Emission alignment of these facilities with the requirements of the EU regulations is required in the forthcoming period.

Measuring equipment for continuous emission measurement was not installed in thermal power plants - concentration level of dust and gases (SO<sub>2</sub>, NO<sub>x</sub>, CO, CO<sub>2</sub>) in flue gases. Emission control is carried out once a year by the authorised institution.

Equipment for dust treatment of flue gases - electrostatic precipitators (ESP) - was installed in Nikola Tesla B Thermal Power Plant as an air protection measure when it was constructed in 1984-1985 without desulphurisation and denitrification of flue gases. Flue gases of this unit are emitted into the atmosphere over a stack with the height H=280 m, therefore the operating state of the electrostatic precipitator has a direct impact on air pollution of the immediate environment.



After about 23 years of operation, the large scale emissions from the thermal power plant due to the lack of effective ESPs leads in particular to significant deposits of heavy particles and emissions of sulphur and nitrogen oxides in the surrounding areas which experience a high incidence of respiratory illnesses, particularly among children and acid rains in transboundary context. This pollution also causes damage to crops, agricultural products and forestry. Power station plumes can travel considerable distances with little dilution.

Since 2000, EPS has taken a series of actions aimed at improvement of the operation of thermal units, as well

as increase of the availability and reliability of units in operation. By 2004, within the capital overhaul and regular overhauls, special attention was paid to the ESP, with the purpose of bringing the existing ESP after ten-year operation to the maximum reliability level within the existing technologies, FGD, DENOX existing technologies and reconstruction of ash handling systems in EPS TPPs.

Since 2004, alignment of EPS operation with the legal regulations has been started. Other projects were also launched related to environmental improvement around the TPP and on a broader level. Performed reconstructions at EPS TPPs in the period between 2004 and 2007 include:

### Electrostatic precipitators of fly gases

Replacement of the existing ESPs with new ones:

TPP	Unit	Year of reconstruction	Financing
Nikola Tesla A	A1, A2, A4, A5, A6	2004 - 2009	EU (EAR, IPA), SEPF, EPS
Nikola Tesla B	B1, B2	2009 - 2010 (expected)	EU (IPA)
Kolubara A	A5	2009	SEPF
Morava (Svilajnac)	A	2010	EU (IPA)
Kostolac A	A1, A2	2004 - 2006	EU (EAR), EPS
Kostolac B	B1, B2	2009 - 2011 (expected)	SEPF, EPS

ESP reconstruction of Units are based on the EAR's Feasibility Study of 2003.

### Ash handling systems

Replacement of the existing Ash handling systems ESPs with new ones:

TPP	Year of reconstruction	Cost (mil. €)	Financing
Nikola Tesla A	2010 - 2012 (expected)	40.0	EU IPA)
Nikola Tesla B	2007 - 2009	35.0	EU (EAR)
Kolubara A	2008 - 2009	5.0	SEPF
Morava (Svilajnac)	2010	4.0	EPS
Kostolac A	2009 - 2010	13.0	KfW loan - EPS
Kostolac B	2007 - 2009 (expected)	17.0	EBRD loan - EPS

### Flue gas desulphurisation plants

Building of new ones:

TPP	Planned Year	Cost (mil. €)	Financing
Nikola Tesla A	2012 - 2015	170.0	EPS
Nikola Tesla B	2010 - 2013 (expected)	210.0	EU (IPA), EPS
Kostolac B	2009 - 2011 (expected)	125.0	SEPF, NIP, EPS

Legend :

- EU - European Union
- SEPF - Serbian Environmental Protection Fond
- NIP - National Investment Fond
- EPS - Electric Power Industry of Serbia

By aligning electrostatic precipitator operation with requirements of the EU regulations for dust emission reduction, the total dust emission from TPP Nikola Tesla A and TPP Nikola Tesla B, after performed ESP reconstruction on TPP Nikola Tesla A - Units 1, A2, A3, A4 and A5, was reduced by 85%; while the total dust emission at TPP Kostolac A and TPP Kostolac B was reduced after ESP reconstruction on Units A1 and A2 by 54%.

Pursuant to the Law on Integrated Pollution Prevention and Control, TPP Nikola Tesla (TPP Nikola Tesla A, TPP Nikola Tesla B, TPP Kolubara (Unit A5) and TPP Morava) should obtain an operation permit by 2015, while one of the conditions for obtaining of this permit is alignment of their operation with the requirements of legal regulations, related to the continuous emission measurements.

Between 2003–2007 during the ESP reconstruction, equipment for continuous air emission measurement of harmful and hazardous substances was installed at a number of TPPs, but some remained uncontrolled. This project is designed to address this lack.

The project would be implemented in the context of the previous experience in the settlement of this issue reflected through implementation of Studies, Programmes and Plans implemented so far:

- Implementation of the STUDY – *Directions for Optimal Sulphur Oxides Emission Reduction from EPS TPPs* considering technical solutions for sulphur oxides emission reduction from existing facilities and supplying the proposal of FGD plant introduction according to facilities, as well as implementation schedule with necessary funds;
- Ongoing PROJECT – *Development of Investments – Technical Documents of FGD Plant at TPP Kostolac B*;
- *Mid-term Environmental Protection Development Plan, representing an integral part of Mid-Term Business Plan for the Period 2006 – 2010*, considering the cost schedule for sulphur oxides emission reduction, i.e. introduction of flue gas desulphurisation plants.

In addition to this, installation of FGD plants would be carried out in the context of Serbian legislation. In accordance with the Law on Integrated Pollution Prevention and Control, TPP Nikola Tesla B should obtain an operating permit by 2015; whereas one of the conditions for this is harmonisation of FGD plant operation with emission limit values (ELV) of harmful substances into air, and through that with emission limit values for sulphur oxides.

In case that this project is not implemented by 2015, PE EPS would not be able to meet the requirements of both Serbian and EU legislation.

### 3.2 Assessment of project impact, catalytic effect, sustainability and cross border impact (where applicable)

#### Impact

After the implementation of the project and construction of FGD plant at TPP Nikola Tesla B with necessary ancillary

facilities, sulphur oxides emission reduction will be from 1200 – 3000 mg/m<sup>3</sup> to 400 mg/m<sup>3</sup>, which will have an impact on the air quality improvement around the TPP and also into the cross border context, reduction of soil and forestry contamination and reduction of the number of people suffering from respiratory illnesses in this area. The number of sections will be increased within the planned reconstruction, with the achievement of higher reliability of operation of these FGD. In addition to this, analyzers for continuous dust emission measurement in flue gases after the FGD will be installed, enabling constant control of ESP operation.

This project will also enable continuous monitoring of emission of harmful substances from flue gases of the power plant of EPS, TPP Nikola Tesla B, situated nearby the town of Obrenovac (about 30 000 inhabitants), and 40 km away from Belgrade.

Quality emission monitoring would enable improvement of air quality around the TPP. The number of people suffering from respiratory illnesses, now increasing in this area, would be reduced. Harmful impact on soil would also be reduced around the facilities through constant control of operational efficiency of installed FGD plant.

#### General Objective of the Project:

- Fulfillment of legal regulations regarding SO<sub>2</sub> emission into the atmosphere in accordance with the EU legislation and directives (Directive 2001/80/EC for large combustion plants);
- Reduction of ambient air pollution.

#### Specific Objectives of the Project:

- Construction of FGD plant at TPP Nikola Tesla B with necessary ancillary facilities;
- Air emission reduction of sulphur oxides;
- Sulphur oxides concentration reduction, from 1200 – 3000 mg/m<sup>3</sup> to 400 mg/m<sup>3</sup>;
- Achievement of stakeholder satisfaction concerning environmental quality improvement.

#### Catalytic effects

The health of the working and the youngest population will be improved, with all direct and indirect effects: reduction of health costs, both curative and preventive for all levels and age groups of population; increased efficiency of the working part of population; reduced pollution of agricultural surfaces; improved economy of the affected areas.

It is difficult to enforce environmental legislation in the private sector when the bulk of pollution is the responsibility of such a large public organisation as EPS. When EPS has cleaned up its operations, general enforcement will be easier to implement and better justified.

#### Sustainability

The Government Memorandum on budget for 2008 with projections for 2009 and 2010 shows that the Government commits itself to undertake gradual annual tariff adjustments in order to reach cost-recovering tariffs for electricity in compliance with European levels, thus allowing EPS to raise finance for investment in environmental projects. The current round of investment through donor financing



should therefore represent a one-off improvement to bring the Serbian power generating capacity to a point where sustainable further development is possible without subsidy or further donor intervention.

Through adoption and approximation of Serbian legislation to the EU standards, far greater attention in future will be given to potentially hazardous substances, and avoiding a repeat of the present situation will become a mainstream task of energy producers and environmental agencies alike.

### 3.3 Results and measurable indicators

#### Component

A new FGD plant procured and installed at TPP Nikola Tesla B that will significantly reduce atmospheric pollution in the region.

Measurable indicators will be:

- Degree of compliance with a procurement and installation schedule to be developed with the tender documentation;
- Performance characteristics of the equipment and facilities provided by the supplier;
- National and EU standards concerning the quality of air;
- Number of operation staff trained.

### 3.4 Activities

#### Activities related to component

1. Manufacture and transport of equipment
2. Installation of equipment
3. Commissioning with all accompanying tests
4. Maintenance crew trained; training of EPS staff for supervision and continuous maintenance of equipment and facilities
5. Continuous operation of the facility and analysis of operation results.

All activities should be carried out in accordance with the latest domestic and EU legislation.

### 3.5 Contracting arrangements

#### Component

There will be one supply contract for equipment including works that will be carried out by the equipment suppliers. Supervision and testing will be carried out by the staff of EPS.

### 3.6 Conditionality and sequencing

It will be a condition that the technical specifications are prepared by the beneficiary. Implementation of the works

must be overseen by a qualified supervising engineer. For operational reasons (the need to operate the power plants during the peak winter period) works on installation of equipment the FGD plant must be undertaken during the planned plant shutdown periods.

### 3.7 Linked activities

Since 2000, EPS has taken a series of actions aimed at the improvement of operation of thermal units, as well as availability and reliability increase of units in operation.

By 2004, within the capital overhaul and regular overhauls, special attention was paid to the ESP, with the purpose to bring the existing ESP after ten-year operation to the maximum reliability level within the existing technologies. Since 2004, alignment of EPS operation with the legal regulations has been started.

Other projects were also launched related to environment improvement around the TPP and on a broader level:

- Capital overhauls of units A3 TPP Nikola Tesla A, reconstruction of ESP (€64.5 m CARDS 2002)
- Study of pollution from thermal power stations in Serbia and on pollution mitigation measures and their costs (€0.75 m CARDS 2003)
- Reconstruction of Unit A1, A2, A4 and A5 ESPs, TPP Nikola Tesla A between 2004-2007 (€58 m)
- Reconstruction of Unit A2, ESPs, TPP Kostolac A, 2006 year, financed by EAR.
- Environmental clean up measures (based on the study undertaken under the 2003 programme) (Electrostatic precipitators at Kostolac A and ash transport and storage at Nikola Tesla B power plant (€35 m).
- Ash handling system reconstruction with the thick slurry system at TPP Nikola Tesla B, through which reduction of ash dispersion from the ash disposal will be achieved. Project implementation has been started in 2007, financed by EAR.

### 3.8 Lessons learned

Experience on reconstruction executed so far has shown that equipment delivery period from abroad was prolonged, having an impact on the completion of the planned reconstruction implemented during overhauls, whose beginning and duration period is limited during the year. This is the reason why the tenders for procurement and delivery of the equipment necessary for the reconstruction should be planned earlier, since equipment comes from abroad.

Participation of domestic firms in the reconstruction was assessed as positive and they have demonstrated their technical ability to carry out the reconstruction to the end.

## 4 INDICATIVE BUDGET (AMOUNTS IN M€)

Activities	TOTAL PUBLIC COST	SOURCES OF FUNDING										
		EU CONTRIBUTION				NATIONAL PUBLIC CONTRIBUTION						PRIVATE
		Total	% *	IB	INV	Total	Type of cofinancing (J / P) **	% *	Central	Regional	IFIs	
Activity 1												
contract 1	210.00	157.50	75%		157.50	52.50	P	25%	52.50			
TOTAL	210.00	157.50	75%		157.50	52.50	P	25%	52.50			

Amounts net of VAT

\* expressed in % of the Total Public Cost

## 5 INDICATIVE IMPLEMENTATION SCHEDULE

Contracts	Start of Tendering	Signature of contract	Project Completion
Contract 1	T + 1Q	T + 4Q	T + 10Q

## 6 CROSS CUTTING ISSUES

### 6.1 Equal Opportunity

The beneficiary will make sure its objectives, policies and interventions have a positive impact on and are in line with the main principles of gender equality. It will ensure equal opportunities clauses in all tendering material for procurement of equipment.

### 6.2 Environment

The objective of this project is to help Serbia to achieve compliance with the Environmental Acquis, as required by the Energy Community Treaty. This project will thus directly involve mainstreaming of environmental issues.

### 6.3 Minorities

As minorities and other vulnerable groups are usually the first to suffer from environmental degradation, and have the least chance of protecting themselves (e.g. by choosing residences in non-polluted areas), this project will improve their conditions in terms of reduced health hazards.

## ANNEX 1: LOGICAL FRAMEWORK MATRIX

Project is proposed by the Ministry of Mining and Energy, with the main beneficiary being the Public Enterprise Electric Power Industry of Serbia. Total value of the project amounts to 210 million euros, out of which 157.5 million euros is proposed the EU contribution and the remaining 52.5 million euros the national co-financing. This project is the last phase of an integrated programme for upgrading of the facilities at TPP Nikola Tesla B; this programme's objective is to rectify in a logical manner the legacy of many years of environmental degradation. Investment-technical documents for this project will be finalised in the end of 2009. The proposals that form the basis for this project have been scrutinised by the Ministry of Environmental Protection and Spatial Planning, an EIA will be conducted and approved and the various planning and construction permits will be obtained. The appropriate technological solution has been chosen and approved. The project's main objective is to reduce atmospheric pollution generated by TPP Nikola Tesla B thus contributing to environmental harmonization and removal of serious health hazards by fulfilling the Directive 2001/80/EC for large combustion plants (modernizing specified Thermal Power Plants) and 96/62/EC. Project result includes procurement and installation of the flue gas desulphurisation plant at TPP Nikola Tesla B.



LOGFRAME PLANNING MATRIX FOR PROJECT FICHE		Project Title: Environmental Protection at EPS - (flue gas desulphurisation plant at TPP Nikola Tesla B)	
		Total budget: 210,000,000 Euro	IPA budget: 157,500,000 Euro
OVERALL OBJECTIVE	Objectively verifiable indicators	Sources of Verification	
To reduce the levels of atmospheric pollution generated from TPP Nikola Tesla B, by installing an FGD plant thus contributing to environmental harmonisation and removal of serious health hazards	<p>Serbian practice in line with the EU norms.</p> <p>Reduction of the level of sulphur-oxides in ambient air in the region surrounding the TPP</p> <p>Reduction of soil contamination</p> <p>Reduction of transboundary transport of sulphur oxides and contamination</p> <p>Reduction of influence of acid rains soil contamination and forestry</p> <p>Reduction of incidence of diseases associated with environmental contaminants</p>	<p>EPS reports</p> <p>Annual report of Environmental Protection Agency on air quality within the impact zone</p> <p>Annual statistics report of the Ministry of Health on the number of people suffering from respiratory illnesses</p>	
SPECIFIC PROJECT PURPOSE	Objectively verifiable indicators	Sources of Verification	Assumptions
To fulfill the Directive 2001/80/EC for large combustion plants by modernising TPP Nikola Tesla B according to the EC Directive 96/62/EC	<p>Consistency of emissions control at TPPs over a longer period</p> <p>State of EPS installations and surrounding environment in comparison with the EU norms.</p> <p>Air quality indicators improved to the level defined by EU standards</p>	<p>EPS / TPP technical reports</p> <p>Reports of the Serbian Environmental Protection Agency</p> <p>Annual Report on the State of Environmental Protection of the Electric Power Industry of Serbia</p> <p>Local and nation media reports</p>	EU standards do not change while the project is being implemented.

RESULTS	Objectively verifiable indicators	Sources of Verification	Assumptions
A new FGD plant procured and installed at TPP Nikola Tesla B that will significantly reduce atmospheric pollution in the region.	<p>Degree of compliance with a procurement and installation schedule to be developed with the tender documentation.</p> <p>Performance characteristics of the equipment and facilities provided by the supplier</p> <p>National and EU standards concerning the quality of air</p> <p>Number of operation staff trained</p>	<p>Project reports</p> <p>Contract with the supplier</p> <p>Technical specification of the Supplier</p> <p>Reports of the Serbian Environmental Protection Agency</p> <p>Annual Report on the State of Environmental Protection of the Electric Power Industry of Serbia</p> <p>Issued certificates to the operational staff in TPP Nikola Tesla B</p>	<p>Continued support by top management of EPS for issues of environmental protection.</p> <p>National Authorities committed to the fulfillment of EU standards in the environmental sector</p> <p>Political stability and continuation of harmonization process with EU</p>
ACTIVITIES	Means	Means & Costs	Assumptions
<p>Manufacture and transport of equipment</p> <p>Installation of equipment</p> <p>Commissioning with all accompanying tests</p> <p>Maintenance crew trained; training of EPS staff for supervision and continuous maintenance of equipment and facilities</p> <p>Continuous operation of the facility and analysis of operation results.</p>		<p>210 m€</p> <p>This project will be implemented through a 'turnkey' contract, according to FIDIC procedures to design, build and supervise the supply, commissioning and initial operation of new facilities and equipment with appropriate monitoring personnel supplied by EPS.</p>	<p>Competent and qualified consulting and engineering companies interested and available for the project</p> <p>Willingness of TPP Nikola Tesla B staff to apply new production &amp; control technologies</p> <p>Equipments and the facilities available on the market</p>



## ANNEX 2: AMOUNTS (IN €) CONTRACTED AND DISBURSED BY QUARTER FOR THE PROJECT

(IPA contribution only)

Contracted	2009				2010				2011				Total
	QR1	QR2	QR3	QR4	QR1	QR2	QR3	QR4	QR1	QR2	QR3	QR4	
Contract				157.5 m€									157.5 m€
Cumulated				157.5 m€									157.5 m€
Disbursed													
Contract				78.75 m€							78.75 m€		157.5 m€
Cumulated				78.75 m€							78.75 m€		157.5 m€

## ANNEX 3: INSTITUTIONAL FRAMEWORK – LEGAL RESPONSIBILITIES AND STATUTES

Close cooperation of the PE EPS and the following institutions is necessary:

- Ministry of Mining and Energy;
- Ministry of Finance;
- Ministry of Environment and Spatial Planning;
- Municipalities and local communities on whose territory TPP is located.

## ANNEX 4: REFERENCE TO LAWS, REGULATIONS AND STRATEGIC DOCUMENTS

Reference list of relevant laws and regulations:

- Directive 2001/80/EC defining harmful substances emission limit values from large combustion plants;
- Directive 96/62/EC - framework, related to the quality of ambient air;
- Convention on Long-Distance Cross-Border Air Pollution;
- Contract on the Founding of SE Europe Energy Community, which came into force in July 2006, within which implementation of the Directive 2001/80/EC is planned;
- Law on Environmental Protection - Official Gazette RS № 135/04;
- Law on Integrated Pollution Prevention and Control - Official Gazette RS № 135/04;
- Draft Law on Air Protection;
- Energy Development Strategy by 2015 (Republic of Serbia);
- The Programme of Energy Development Strategy Implementation of the Republic of Serbia by 2015 for the period from 2007 and 2012;
- Sustainable Development Strategy of the Republic of Serbia
- National Environmental Programme of the Republic of Serbia (NEAP RS);
- Ratification Law of Kyoto Protocol on Long-Distance Cross-Border Air Pollution;

- Legal requirement concerning operation harmonisation of existing units with ELV requirements for air emission of harmful substances: Environmental Protection Law (Republic of Serbia) and the Law on Integrated Pollution Prevention and Control (Republic of Serbia);
- Orientation of the Electric Power Industry of Serbia towards the fulfillment of all EU norms and standards from the subject field;
- Framework Plan of the Electric Power Industry of Serbia for the Reduction of Harmful Substances Emission from EPS TPPs considered within the Study: 'Emission Control from Coal-Fired TPPs of Electric Power Industry of Serbia', financed by the European Agency for Reconstruction during 2003. The Plan was developed in cooperation with EPS, Ministry of Mining and Energy and Ministry of the Protection of Natural Resources and Environmental Protection of the Republic of Serbia.

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## ANNEX 5: DETAILS PER EU-FUNDED CONTRACT (\*) WHERE APPLICABLE

### Component

A new FGD plant procured and installed at TPP Nikola Tesla B, with output of sulphur oxides concentration of 400 mg/m<sup>3</sup>.

Measuring equipment for continuous emission measurement of harmful and hazardous substance on thermal power plants to measure:

- emission parameters: SO<sub>2</sub>, NO<sub>x</sub> (reduced to NO<sub>2</sub>), CO, CO<sub>2</sub>, dust,
- operation parameters: temperature, oxygen.



**SUMMARY PROJECT FICHE**

**RECONSTRUCTION OF ASH AND  
SLAG HANDLING SYSTEM AT  
TPP NIKOLA TESLA A**



# STANDARD SUMMARY PROJECT FICHE

## – IPA DECENTRALISED NATIONAL PROGRAMMES

### 1 BASIC INFORMATION

#### 1.1 CRIS Number

EC to complete

#### 1.2 Title

Environmental Protection at EPS - RECONSTRUCTION OF ASH AND SLAG HANDLING SYSTEM AT TPP NIKOLA TESLA A

#### 1.3 ELARG statistical code

EC to complete

#### 1.4 Location

Republic of Serbia

### Implementing arrangements

#### 1.5 Contracting Authority (EC)

EC Delegation in Serbia

#### 1.6 Implementing Agency

EC Delegation in Serbia

#### 1.7 Beneficiary (including details of project manager)

The SPO will be Assistant Minister Predrag Sekeljic, Ministry of Mining and Energy

Responsible for the management of the project: Mihajlo Gavrić – EPS, Manager of the Environmental Protection Sector, Electric Power Industry of Serbia – EPS

A Steering Committee will be formed consisting of approximately 6 members. It will be chaired by the SPO and it will include representatives of the EC Delegation and other stakeholders such as the Ministry of Mining and Energy, the Ministry of Environment, Ministry of Forestry and Water Resources Management, Ministry of Finance etc.

#### 1.8 Overall cost

40,000,000 Euro

#### 1.9 EU contribution

30,000,000 Euro

#### 1.10 Final date for contracting

Dec 2012 (n + 3)

#### 1.11 Final date for execution of contracts

Dec 2014 (n + 3 + 2)

#### 1.12 Final date for disbursements

Dec 2015 (n + 3 + 2 + 1)

### 2 OVERALL OBJECTIVE AND PROJECT PURPOSE

#### 2.1 Overall Objective

Improved health conditions of the population affected by pollution from NTA (reduction of ambient air pollution, reduction of ground water contamination and reduction of surface water contamination) by upgrading and installing the new ash & slag handling system.

#### 2.2 Project purpose

Environmental conditions at a local and regional (air, water and soil) improved (dust emissions reduced & waste water treated)

Capacities of TPP NT A modernized by upgrading the ash and slag handling system.

#### 2.3 Link with AP/NPAA / EP/ SAA

AP and NPAA are not applicable

The Plan for Implementation of the European Partnership Priorities has listed detailed task with regards to the Environment and Energy sector – 7.3.2 - to begin implementation of the national environmental strategy, 7.3.5 - to implement adopted legislation on industrial pollution, 7.3.12 – to continue to implement the national environment protection strategy, 7.5.1 to implement the Commitments undertaken within the framework of the Energy Community Treaty.

Commission working document “Serbia 2007 Progress Report” as of 6.11.2007 (SEC(2007) 1435), regarding the Stabilisation and Association Agreement and the European Partnership priorities, where on page 34 stands “Limited progress has been made in implementing legislation on industrial pollution control and risk management. Work on plans to achieve compliance of existing installations with the legal requirements has been initiated, on pilot project basis”.

Under the European Partnership Serbia is committed to “establish an independent Energy Regulatory Agency and carry out environmental audits on energy plants and address worst polluters.”(p. 12). Under Article 111 (Environment) of the SAA, Serbia is obliged to halt further degradation and start improving the environmental situation with the aim of sustainable development.

This project is strongly linked with the quoted documents, tasks and expectations.

The Energy Community Treaty signed multilaterally by the EU Commission and Balkan countries introduces the legal requirement for Serbia to implement the Acquis on the Environment. Annex II of the Treaty sets the deadline of 31 December 2017 for implementation

of the Directive 2001/80/EC (the 'large power plant' Directive), which is a relatively short period for such a major programme of works, and with such a high cost.

Under the European Partnership Serbia is committed to "establish an independent Energy Regulatory Agency and carry out environmental audits on energy plants and address the worst polluters." (p. 12).

Under Article 111 (Environment) of the SAA, Serbia is obliged to halt further degradation and start improving the environmental situation with the aim of sustainable development. ...Cooperation could also centre on the development of strategies to significantly reduce local, regional and trans-boundary air and water pollution, to establish a system for efficient, clean, sustainable and renewable production and consumption of energy. (p. 59).

## 2.4 Link with MIPD

Energy: Compliance support to meet the needs of the Regional Energy Treaty, relevant Community Directives and regional market obligations; compliance of legislation with the acquis. (p. 23).

Environment: Support to the approximation and implementation of Environmental legislation and related strategies... (p. 22).

The benefit from this project will be the implementation of the EU Directives 2001/80/EC for large combustion plants, Water Framework Directive, EU Directive 2000/60/EC and Directive 96/62/EC – framework, related to the quality of ambient air.

## 2.5 Link with National Development Plan (where applicable)

n/a

## 2.6 Link with national/sectoral plans

The project is in accordance with all of the following strategic documents:

- Sustainable Development Strategy of the Republic of Serbia
- The Programme of Energy Development Strategy Implementation of the Republic of Serbia by 2015 for the period from 2007 and 2012
- Waste Management Strategy (the whole document)
- National Environmental Programme of the Republic of Serbia (NEAP RS)
- The Framework Plan of the Electric Power Industry of Serbia for the Reduction of Harmful Substances Emission from EPS TPPs considered within the Study: 'Emission Control from Coal-Fired TPPs of Electric Power Industry of Serbia', was financed by the European Agency for Reconstruction during 2003. The Plan was developed in cooperation with EPS, Ministry of Mining and Energy and Ministry of the Protection of Natural Resources and Environmental Protection of the Republic of Serbia.
- The Pre-feasibility Study for Emission Control for Coal-Fired Power Plants, financed for EAR during

2003 by RWE Innogy, established the priority facilities for harmful substance emission alignment from EPS TPPs.

- The new Serbian Environmental Protection Law anticipates continuous control of air emission of harmful substances for all TPPs.
- Sustainable development and environmental management measures were planned for the next ten years for the Republic of Serbia within the National Environmental Program of the Republic of Serbia (NEAP RS – Draft) adopted in accordance with the Environmental Protection Law (Official Gazette RS № 135/04).
- EPS Development Plan and EPS Mid-Term Development Plan define the need to reduce dust emission from existing thermal power plants and ash landfill.

The proposed project is in the field of waste management and air quality protection, one of the first priorities which is one part of the restructuring of environmental protection in EPS, and represents some 70% of the problem of environmental protection in the Republic of Serbia.

# 3 DESCRIPTION OF PROJECT

## 3.1 Background and justification

During the last decade of the twentieth century, Serbia had many problems such as social-economic setbacks, isolation and a difficult inheritance which resulted in Serbia neglecting environmental issues. As the country emerges from this period, fresh attention is being given to the environment so that technical and energy-related development assumes a cleaner nature than hitherto. The Electric Power Industry of Serbia (EPS) with its activities - starting from natural resources, coal and hydro potential to the generation, transmission and distribution of electricity - has a great impact on the natural state of environment. Thermal power facilities are without a doubt the biggest polluters of air, compared to other plants and facilities within EPS. In accordance with the Serbian policy of association and harmonisation with the EU and its standards, the Electric Power Industry of Serbia decided to give first priority to respecting the EU environmental standards.

### *Ash disposal dust emissions*

During the construction of the existing TPPs, there were no legal regulations concerning emission limits at the republic level, so no measures were taken to reduce sulphur and nitrogen oxide emission into the atmosphere. Measures taken to reduce dust emission do not meet the current emission requirements and limits, both of the domestic and EU regulations. Emission alignment of these facilities with the requirements of the EU regulations is required in the forthcoming period.

Since 2000, EPS has taken a series of actions aimed at improvement of the operation of thermal units, as well as increase of the availability and reliability of units in operation. By 2004, within the capital overhaul and regular overhauls, special attention was paid to the ESP, with the



purpose of bringing the existing ESP after ten-year operation to the maximum reliability level within the existing technologies. Since 2004, alignment of EPS operation with the legal regulations has been started. Other projects were also launched related to environmental improvement around the TPP and on a broader level. Performed ESP reconstructions at EPS TPPs and ash handling system in the period between 2004 and 2010 include:

- Replacement of the existing ESPs with new ones: ESP reconstruction of Unit A1, A2 and A5 at TPP Nikola Tesla A, Units A2 and A4 TPP Nikola Tesla A, and TPP Kostolac A 2004-2007.
- Replacement of the existing ESPs with new ones: ESP reconstruction of Unit A5 and ash handling system at TPP Kolubara A, financed by Fond for Environmental protection of the Republic of Serbia about €8 million is being planned 2008-2009.
- Replacement of the existing ESPs with new ones: ESP reconstruction of Unit A6 at TPP Nikola Tesla A, and Units B2 at TPP Nikola Tesla B, financed by IPA/EU about €12 million is being planned 2009-2010.
- Two further ash handling systems, at TPPs Kostolac A and Kostolac B, are being financed by KfW and EBRD amounting to about €40 million in total based on the EAR's Feasibility Study of 2003.
- An ash handling system reconstruction at TPP Nikola Tesla A amounting to about €35 million is being planned.

By aligning electrostatic precipitator operation with requirements of the EU regulations for dust emission reduction, the total dust emission from TPP Nikola Tesla A and TPP Nikola Tesla B, after performed ESP reconstruction on TPP Nikola Tesla A - Units A1, A2, A3, A4 and A5, was reduced by 88%; while the total dust emission at TPP Kostolac A and TPP Kostolac B was reduced after ESP reconstruction on Units A1 and A2 by 54%.

Pursuant to the Law on Integrated Pollution Prevention and Control, TPP Nikola Tesla (TPP Nikola Tesla A, TPP Nikola Tesla B, TPP Kolubara (Unit A5) and TPP Morava) should obtain an operation permit by 2015, while one of the conditions for obtaining of this permit is alignment of their operation with the requirements of legal regulations, related to the continuous emission measurements.

Between 2003–2007 during the ESP reconstruction, equipment for continuous air emission measurement of harmful and hazardous substances was installed at a number of TPPs, but some remained uncontrolled.

### 3.2 Assessment of project impact, catalytic effect, sustainability

#### Impact

After the reconstruction of the ash and slag handling system of TPP Nikola Tesla A, dust and heavy metal emission into the atmosphere, ground and surface waters from ash landfill will be reduced to the level of the EU standards, which will have an impact on air, ground and surface waters quality improvement around the TPP, reduction of contamination

and reduction of the number of people suffering from respiratory and others illnesses in this area. In addition to this, analysers for continuous dust emission measurement after the ash and slag handling system will be installed, enabling constant control.

This project will also enable continuous monitoring of dust emission of harmful substances and heavy metal migration into the waters from ash landfill of TPP Nikola Tesla A, situated nearby the town of Obrenovac (about 30 000 inhabitants), and 40 km away from Belgrade,

Quality emission monitoring would enable improvement of air quality around the TPP Nikola Tesla A. The number of people suffering from respiratory illnesses, now increasing in this area, would be reduced. Harmful impact on soil would also be reduced around the ash landfill through constant control of operational efficiency of reconstructed and installed of ash and slag handling system at TPP Nikola Tesla A.

#### Catalytic effects

The health of the working and the youngest population will be improved, with all direct and indirect effects: reduction of health costs, both curative and preventive for all levels and age groups of population; increased efficiency of the working part of population; reduced pollution of agricultural surfaces, underground and surface waters; improved economy of the affected areas.

It is difficult to enforce environmental legislation in the private sector when the bulk of pollution is the responsibility of such a large public organisation as EPS. When EPS has cleaned up its operations, general enforcement will be easier to implement and better justified.

#### Sustainability

The Government Memorandum on budget for 2008 with projections for 2009 and 2010 shows that the Government commits itself to undertake gradual annual tariff adjustments in order to reach cost-recovering tariffs for electricity in compliance with European levels, thus allowing EPS to raise finance for investment in environmental projects. The current round of investment through donor financing should therefore represent a one-off improvement to bring the Serbian power generating capacity to a point where sustainable further development is possible without subsidy or further donor intervention.

Through adoption and approximation of Serbian legislation to the EU standards, far greater attention in future will be given to potentially hazardous substances, and avoiding a repeat of the present situation will become a mainstream task of energy producers and environmental agencies alike.

### 3.3 Results and measurable indicators

Ash and Slag Handling System at TPP Nikola Tesla A reconstructed.

Capacities developed in EPS for maintenance of equipment/facilities.

Measurable indicators will be:

- Number of items procured and installed;
- Performance characteristics of the equipment and facilities provided by the supplier;

- National and EU standards concerning the quality of air, water and soil;
- Number of operation staff trained.

Measurement of the satisfaction of stakeholders, permanent information and cooperation with the local community and competent organisations.

### 3.4 Activities

Activities related to component

#### 1.1 New Nikola Tesla A TPP facilities manufactured and installed

- manufacture and transport of equipment
- dismantling of old equipment
- installation of equipment
- installation and calibration of the monitoring equipment

#### 1.2 New Nikola Tesla A TPP facilities and equipment tested and verified

- commissioning with all accompanying tests

#### 1.3 Analysis of operation and results

- Confirmation of the fulfillment of the air environmental standards
- Confirmation of the fulfillment of the water environmental standards
- Confirmation of the fulfillment of the soil environmental standards

#### 2. Training of EPS staff for supervision and continuous maintenance of equipment and facilities.

### 3.5 Contracting arrangements

#### Component

This project will be implemented through a “turnkey” contract, according to FIDIC procedures to design, build and supervise the supply, commissioning and initial operation of new facilities and equipment.

### 3.6 Conditionality and sequencing

It will be a condition that the technical specifications are prepared by the beneficiary. Implementation of the works must be overseen by a qualified supervising engineer. For operational reasons (the need to operate the power plants during the peak winter period) works to replace the ESPs must be undertaken during the planned plant shutdown periods.

### 3.7 Linked activities

Since 2000, EPS has taken a series of actions aimed at the improvement of operation of thermal units, as well as availability and reliability increase of units in operation.

By 2004, within the capital overhaul and regular overhauls, special attention was paid to the ESP, with the purpose to bring the existing ESP after ten-year operation to the maximum reliability level within the existing technologies. Since 2004, alignment of EPS operation with the legal regulations has been started.

Other projects were also launched related to environment improvement around the TPP and on a broader level:

- Capital overhauls of units A3 TPP Nikola Tesla A, reconstruction of ESP (€64.5 m CARDS 2002)
- Study of pollution from thermal power stations in Serbia and on pollution mitigation measures and their costs (€0.75 m CARDS 2003)
- Reconstruction of Unit A1, A2, A4 and A5 ESPs, TPP Nikola Tesla A between 2004-2007 (€58 m)
- Reconstruction of Unit A2, ESPs, TPP Kostolac A, 2006 year, financed by EAR.
- Environmental clean up measures (based on the study undertaken under the 2003 programme) (Electrostatic precipitators at Kostolac A and ash transport and storage at Nikola Tesla B power plant (€35 m).
- Ash handling system reconstruction with the thick slurry system at TPP Nikola Tesla B, through which reduction of ash dispersion from the ash disposal will be achieved. Project implementation has been started in 2007, financed by EAR.

### 3.8 Lessons learned

Experience on reconstruction executed so far has shown that equipment delivery period from abroad was prolonged, having an impact on the completion of the planned reconstruction implemented during overhauls, whose beginning and duration period is limited during the year. This is the reason why the tenders for procurement and delivery of the equipment necessary for the reconstruction should be planned earlier, since equipment comes from abroad.

Participation of domestic firms in the reconstruction was assessed as positive and they have demonstrated their technical ability to carry out the reconstruction to the end.



## 4 INDICATIVE BUDGET (AMOUNTS IN M€)

Activities	TOTAL PUBLIC COST	SOURCES OF FUNDING										
		EU CONTRIBUTION				NATIONAL PUBLIC CONTRIBUTION						PRIVATE
		Total	% *	IB	INV	Total	Type of cofinancing (J / P) **	% *	Central	Regional	IFIs	
Activity 1												
contract 1.	40.00	30.00	75%		30.00	10.00	P	25%	10.00			
TOTAL	40.00	30.00	75%		30.00	10.00	P	25%	10.00			

Amounts net of VAT

\* expressed in % of the Total Public Cost

## 5 INDICATIVE IMPLEMENTATION SCHEDULE

Contracts	Start of Tendering	Signature of contract	Project Completion
Contract 1	T + 1Q	T + 4Q	T + 10Q

## 6 CROSS CUTTING ISSUES

### 6.1 Equal Opportunity

The beneficiary will make sure its objectives, policies and interventions have a positive impact on and are in line with the main principles of gender equality. It will ensure equal opportunities clauses in all tendering material for procurement of equipment.

### 6.2 Environment

The objective of this project is to help Serbia to achieve compliance with the Environmental Acquis, as required by the Energy Community Treaty. This project will thus directly involve mainstreaming of environmental issues.

### 6.3 Minorities

As minorities and other vulnerable groups are usually the first to suffer from environmental degradation, and have the least chance of protecting themselves (e.g. by choosing residences in non-polluted areas), this project will improve their conditions in terms of reduced health hazards.

# ANNEX 1: LOGICAL FRAMEWORK MATRIX

Project is proposed by the Ministry of Mining and Energy, with the main beneficiary being the Public Enterprise Electric Power Industry of Serbia. Total value of the project amounts to 40 million euros, with the proposed EU contribution of 30 million and own funding of 10 million euros\*. This project is the last phase of an integrated programme for upgrading of the facilities at NTA; this programme's objective is to rectify in a logical manner the legacy of many years of environmental degradation. Investment-technical documents for this project will be finalised at beginning of 2009. The proposals that form the basis for this project have been scrutinised by the Ministry of Environment and Spatial Planning, an EIA will be conducted and approved and the various planning and construction permits will be obtained. The appropriate technological solution has been chosen and approved. The main objectives are to improve the environmental conditions on the local and regional levels (air, water and soil) by reducing dust emissions, particularly the reconstruction of the ash and slag handling system at TPP Nikola Tesla A and development of capacities in the Electric Power Industry of Serbia for maintenance of equipment/facilities.

\* In accordance with the Directives 96/62/EC-ambient air and 2000/60/EC- Water Framework Directive

LOGFRAME PLANNING MATRIX FOR PROJECT FICHE		Programme name and number: Reconstruction of ash and slag handling system at TPP Nikola Tesla A	
		Contracting period expires Dec 2011 Total budget : <b>40,000,000 Euro</b>	Disbursement period expires Dec 2014 IPA budget: 30,000,000 Euro
OVERALL OBJECTIVE	Objectively verifiable indicators	Sources of Verification	
Improved health conditions of the population affected by pollution from NTA (reduction of ambient air pollution, reduction of ground water contamination and reduction of surface water contamination) by upgrading and installing the new ash & slag handling system.	Rate of new cases of lung and other pollution caused diseases among population reduced to normal levels	Reports and analysis issued by Ministry of Health of the Republic of Serbia Health Monitors issued by Institute of Public Health of Serbia	
SPECIFIC PROJECT PURPOSE	Objectively verifiable indicators	Sources of Verification	Assumptions
Environmental conditions at a local and regional (air, water and soil) level improved (dust emissions reduced & waste water treated)* Capacities of TPP NT A modernized* by upgrading the ash & slag handling system.	Air, water and soil quality indicators improved to the level defined by the EU standards Complaints and protests organized by local community eliminated	Environmental reports issued by the Republic Hydrometeorological Service of Serbia Reports of the Serbian Environmental Protection Agency Annual Report on the State of Environmental Protection of the Electric Power Industry of Serbia Local and nation media reports	Population consulting health practitioners on a regular basis



RESULTS	Objectively verifiable indicators	Sources of Verification	Assumptions
Ash and Slag Handling System at TPP Nikola Tesla A reconstructed Capacities developed in EPS for maintenance of equipment/ facilities	Number of items procured and installed Performance characteristics of the equipment and facilities provided by the supplier National and EU standards concerning the quality of air, water and soil Number of operation staff trained	Contract with the supplier Technical specification of the Supplier Inception report Final report Environmental reports issued by the Republic Hydrometeorological Service of Serbia Reports of the Serbian Environmental Protection Agency Annual Report on the State of Environmental Protection of the Electric Power Industry of Serbia Issued certificates to the operational staff in TPP NTA	National Authorities committed to the fulfillment of EU standards in the environmental sector Political stability and continuation of harmonization process with EU Local community willing to support project initiatives
ACTIVITIES	Means	Means & Costs	Assumptions
1. 1 New Nikola Tesla A TPP facilitates manufactured and installed - manufacture and transport of equipment - dismantling of old equipment - installation of equipment - installation and calibration of the monitoring equipment 1.2 New Nikola Tesla A TPP facilities and equipment tested and verified - commissioning with all accompanying tests 1.3 Analysis of operation and results - Confirmation of the fulfillment of the air environmental standards - Confirmation of the fulfillment of the water environmental standards - Confirmation of the fulfillment of the soil environmental standards 2. Training of EPS staff for supervision and continuous maintenance of equipment and facilities		40 m€ This project will be implemented through a “turnkey” contract, according to FIDIC procedures to design, build and supervise the supply, commissioning and initial operation of new facilities and equipment	Competent and qualified consulting and engineering companies interested and available for the project Willingness of TPP NT A staff to apply new production & control technologies Equipments and the facilities available on the market

\* In accordance with the Directives 96/62/EC-ambient air and 2000/60/EC- Water Framework Directive

## ANNEX 2: AMOUNTS (IN €) CONTRACTED AND DISBURSED BY QUARTER FOR THE PROJECT

Contracted	2009				2010				2011				Total
	QR1	QR2	QR3	QR4	QR1	QR2	QR3	QR4	QR1	QR2	QR3	QR4	
Contract				30.0 m€									30.0 m€
Cumulated				30.0 m€									30.0 m€
Disbursed													
Contract				15.0 m€							15.0 m€		30.0 m€
Cumulated				15.0 m€							15.0 m€		30.0 m€

## ANNEX 3: INSTITUTIONAL FRAMEWORK – LEGAL RESPONSIBILITIES AND STATUTES

Close cooperation of the PE EPS and the following institutions is necessary:

- Ministry of Mining and Energy;
- Ministry of Finance;
- Ministry of Environment and Spatial Planning;
- Ministry of Forestry and Water Resources Management;
- Municipalities and local communities on whose territory TPP is located.

## ANNEX 4: REFERENCE TO LAWS, REGULATIONS AND STRATEGIC DOCUMENTS

Reference list of relevant laws and regulations:

- Directive 2001/80/EC defining harmful substances emission limit values from large combustion plants;
- Directive 96/62/EC - framework, related to the quality of ambient air;
- Convention on Long-Distance Cross-Border Air Pollution;
- Directive 2000/60/EC - Water Framework Directive
- Convention on Co-operation for the Protection and Sustainable Use of the River Danube
- Contract on the Founding of SE Europe Energy Community, which came into force in July 2006, within which implementation of the Directive 2001/80/EC is planned;
- Law on Environmental Protection - Official Gazette RS № 135/04;
- Law on Integrated Pollution Prevention and Control - Official Gazette RS № 135/04;
- Directive 96/59/EC;
- Draft Law on Waste Management;
- Draft Law on Air Protection;
- Energy Development Strategy by 2015 (Republic of Serbia);



- Sustainable Development Strategy of the Republic of Serbia
- The Programme of Energy Development Strategy Implementation of the Republic of Serbia by 2015 for the period from 2007 and 2012;

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## **ANNEX 5: DETAILS PER EU-FUNDED CONTRACT (\*) WHERE APPLICABLE**

### **Component 1**

A new ash and slag handling system procured and installed at TPP Nikola A.



**SUMMARY PROJECT FICHE**

**ENVIRONMENTAL PROTECTION AT EPS  
ELECTROSTATIC PRECIPITATOR  
AT TPP MORAVA SVILAJNAC**



# STANDARD SUMMARY PROJECT FICHE

## – IPA DECENTRALISED NATIONAL PROGRAMMES

### 1 BASIC INFORMATION

#### 1.1 CRIS Number

EC to complete

#### 1.2 Title

Environmental Protection at EPS – Electrostatic Precipitator at TPP Morava Svilajnac

#### 1.3 ELARG statistical code

EC to complete

#### 1.4 Location

Republic of Serbia

### Implementing arrangements

#### 1.5 Contracting Authority (EC)

EC Delegation in Serbia

#### 1.6 Implementing Agency

EC Delegation in Serbia

#### 1.7 Beneficiary (including details of project manager)

The SPO will be Assistant Minister Predrag Sekeljic, Ministry of Mining and Energy

Responsible for the management of the project: Mihajlo Gavrić – EPS, Manager of the Environmental Protection Sector, Electric Power Industry of Serbia – EPS

A Steering Committee will be formed consisting of approximately 6 members. It will be chaired by the SPO and it will include representatives of the EC Delegation and other stakeholders such as the Ministry of Mining and Energy, the Ministry of Environment, Ministry

#### 1.8 Overall cost

5,000,000 Euro

#### 1.9 EU contribution

3,750,000 Euro

#### 1.10 Final date for contracting

Dec 2011 (n + 3)

#### 1.11 Final date for execution of contracts

Dec 2014 (n + 3 + 2)

#### 1.12 Final date for disbursements

Dec 2015 (n + 3 + 2 + 1)

### 2 OVERALL OBJECTIVE AND PROJECT PURPOSE

#### 2.1 Overall Objective

To reduce the levels of atmospheric pollution generated from TPP Morava, by installing an Electrostatic Precipitator thus contributing to environmental harmonisation and removal of serious health hazards

#### 2.2 Project purpose

To fulfill the Directive 2001/80/EC for large combustion plants by modernising specified Thermal Power Plants (TPPs) and Directive 96/62/EC.

#### 2.3 Link with AP/NPAA / EP/ SAA

AP and NPAA are not applicable

The Plan for Implementation of the European Partnership Priorities has listed detailed task with regards to the Environment and Energy sector – 7.3.2 - to begin implementation of the national environmental strategy, 7.3.5 - to implement adopted legislation on industrial pollution, 7.3.12 – to continue to implement the national environment protection strategy, 7.5.1 to implement the Commitments undertaken within the framework of the Energy Community Treaty.

Commission working document “Serbia 2007 Progress Report” as of 6.11.2007 (SEC(2007) 1435), regarding the Stabilisation and Association Agreement and the European Partnership priorities, where on page 34 stands “Limited progress has been made in implementing legislation on industrial pollution control and risk management. Work on plans to achieve compliance of existing installations with the legal requirements has been initiated, on pilot project basis”.

This project is strongly linked with the quoted documents, tasks and expectations.

The Energy Community Treaty signed multilaterally by the EU Commission and Balkan countries introduces the legal requirement for Serbia to implement the Acquis on the Environment. Annex II of the Treaty sets the deadline of 31 December 2017 for implementation of the Directive 2001/80/EC (the ‘large power plant’ Directive), which is a relatively short period for such a major programme of works, and with such a high cost.

Under the European Partnership Serbia is committed to “establish an independent Energy Regulatory Agency and carry out environmental audits on energy plants and address the worst polluters.” (p. 12).

Under Article 111 (Environment) of the SAA, Serbia is obliged to halt further degradation and start improving the environmental situation with the aim of sustainable

development. ...Cooperation could also centre on the development of strategies to significantly reduce local, regional and trans-boundary air and water pollution, to establish a system for efficient, clean, sustainable and renewable production and consumption of energy. (p59).

## 2.4 Link with MIPD

Energy: Compliance support to meet the needs of the Regional Energy Treaty, relevant Community Directives and regional market obligations; compliance of legislation with the acquis. (p. 23)

Environment: Support to the approximation and implementation of Environmental legislation and related strategies... (p. 22)

The benefit from this project will be the implementation of the EU Directives 2001/80/EC for large combustion plants and 96/62/EC.

## 2.5 Link with National Development Plan (where applicable)

n/a

## 2.6 Link with national / sectoral plans

The project is in accordance with all of the following strategic documents:

- Sustainable Development Strategy of the Republic of Serbia
- The Programme of Energy Development Strategy Implementation of the Republic of Serbia by 2015 for the period from 2007 and 2012
- National Environmental Programme of the Republic of Serbia (NEAP RS)
- The Framework Plan of the Electric Power Industry of Serbia for the Reduction of Harmful Substances Emission from EPS TPPs considered within the Study: 'Emission Control from Coal-Fired TPPs of Electric Power Industry of Serbia', was financed by the European Agency for Reconstruction during 2003. The Plan was developed in cooperation with EPS, Ministry of Mining and Energy and Ministry of the Protection of Natural Resources and Environmental Protection of the Republic of Serbia.
- The Pre-feasibility Study for Emission Control for Coal-Fired Power Plants, financed for EAR during 2003 by RWE Innogy, established the priority facilities for harmful substance emission alignment from EPS TPPs.
- The new Serbian Environmental Protection Law anticipates continuous control of air emission of harmful substances for all TPPs.
- Sustainable development and environmental management measures were planned for the next ten years for the Republic of Serbia within the National Environmental Program of the Republic of Serbia (NEAP RS – Draft) adopted in accordance with the Environmental Protection Law (Official Gazette RS № 135/04).

The proposed project is in the field of waste management and air quality protection, one of the first priorities which is one part of the restructuring of environmental protection in EPS, and represents some 70% of the problem of environmental protection in the Republic of Serbia.

## 3 DESCRIPTION OF PROJECT

### 3.1 Background and justification

During the last decade of the twentieth century, Serbia had many problems such as social-economic setbacks, isolation and a difficult inheritance which resulted in Serbia neglecting environmental issues. As the country emerges from this period, fresh attention is being given to the environment so that technical and energy-related development assumes a cleaner nature than hitherto. The Electric Power Industry of Serbia (EPS) with its activities - starting from natural resources, coal and hydro potential to the generation, transmission and distribution of electricity - has a great impact on the natural state of environment. Thermal power facilities are without a doubt the biggest polluters of air, compared to other plants and facilities within EPS. In accordance with the Serbian policy of association and harmonisation with the EU and its standards, the Electric Power Industry of Serbia decided to give first priority to respecting the EU environmental standards.

#### *Flue gases from TPPs*

During the construction of the existing TPPs, there were no legal regulations concerning emission limits at the republic level, so no measures were taken to reduce sulphur and nitrogen oxide emission into the atmosphere. Measures taken to reduce dust emission do not meet the current emission requirements and limits, both of the domestic and EU regulations. Emission alignment of these facilities with the requirements of the EU regulations is required in the forthcoming period.

Measuring equipment for continuous emission measurement was not installed in thermal power plants - concentration level of dust and gases ( $\text{SO}_2$ ,  $\text{NO}_x$ ,  $\text{CO}$ ,  $\text{CO}_2$ ) in flue gases. Emission control is carried out once a year by the authorised institution.

Equipment for dust treatment of flue gases - electrostatic precipitators (ESP) - was installed in Morava Thermal Power Plant as an air protection measure when it was constructed in 1970. Electrostatic precipitators of this unit have an ash handling design value of 98% and a design value of dust concentration in flue gases after electrostatic precipitator of  $1200 \text{ mg/m}^3$ , meaning that even if they operated within their design values they would not meet current legal regulations for dust concentration reduction in the atmosphere, i.e. the prescribed emission limit value. Flue gases of this unit are emitted into the atmosphere over a stack with the height  $H=150\text{m}$ , therefore the operating state of the electrostatic precipitator has a direct impact on air pollution of the immediate environment.

The electrostatic precipitators were designed with a number of sections per precipitator (2 sections, while the new ones have 8 sections), hence section outages have a more



significant impact on the reduction of ash handling level and increase of dust emission from the stack. After about 38 years of operation, the present ESP separation rate is well below design values. The large scale emissions from the thermal power plant due to the lack of effective ESPs leads in particular to significant deposits of heavy particles in the surrounding areas which experience a high incidence of respiratory illnesses, particularly among children. This pollution also causes damage to crops and agricultural products. Power station plumes can travel considerable distances with little dilution. The power plants included in this project are relatively close to fairly large population concentrations - the municipality of Svilajnac in which the power plants are situated, has a population of about 20,000.

Since 2000, EPS has taken a series of actions aimed at improvement of the operation of thermal units, as well as increase of the availability and reliability of units in operation. By 2004, within the capital overhaul and regular overhauls, special attention was paid to the ESP, with the purpose of bringing the existing ESP after ten-year operation to the maximum reliability level within the existing technologies. Since 2004, alignment of EPS operation with the legal regulations has been started. Other projects were also launched related to environmental improvement around the TPP and on a broader level. Performed ESP reconstructions at EPS TPPs in the period between 2004 and 2007 include:

- Replacement of the existing ESPs with new ones: ESP reconstruction of Unit A1, A2 and A5 at TPP Nikola Tesla A, Units A2 and A4 TPP Nikola Tesla A, and TPP Kostolac A 2004-2007
- Two further ash handling systems, at TPPs Kostolac A and Kostolac B, are being financed by KfW and EBRD amounting to about €40 million in total based on the EAR's Feasibility Study of 2003.
- An ash handling system reconstruction at TPP Nikola Tesla A amounting to about €35 million is being planned.

By aligning electrostatic precipitator operation with the requirements of the EU regulations for dust emission reduction, the total dust emission from TPP Nikola Tesla A and TPP Nikola Tesla B, after performed ESP reconstruction on TPP Nikola Tesla A - Units A1, A2, A3, A4 and A5, was reduced by 88%; while the total dust emission at TPP Kostolac A and TPP Kostolac B was reduced after ESP reconstruction on Units A1 and A2 by 54%.

Pursuant to the Law on Integrated Pollution Prevention and Control, TPP Nikola Tesla (TPP Nikola Tesla A, TPP Nikola Tesla B, TPP Kolubara (Unit A5) and TPP Morava) should obtain an operation permit by 2015, while one of the conditions for obtaining of this permit is alignment of their operation with the requirements of legal regulations, related to the continuous emission measurements.

Between 2003–2007 during the ESP reconstruction, equipment for continuous air emission measurement of harmful and hazardous substances was installed at a number of TPPs, but some remained uncontrolled. This project is designed to address this lack.

### 3.2 Assessment of project impact, catalytic effect, sustainability and cross border impact (where applicable)

#### Impact

After the reconstruction of the electrostatic precipitator at TPP Morava, dust emission into the atmosphere from flue gases will be reduced by 90% to the level of 50 mg/m<sup>3</sup>, which will have an impact on the air quality improvement around the TPP, reduction of soil contamination and reduction of the number of people suffering from respiratory illnesses in this area. The number of sections will be increased within the planned reconstruction, with the achievement of higher reliability of operation of these electrostatic precipitators. In addition to this, analysers for continuous dust emission measurement in flue gases after the ESP will be installed, enabling constant control of ESP operation.

Quality emission monitoring would enable improvement of air quality around the TPPs. The number of people suffering from respiratory illnesses, now increasing in this area, would be reduced. Harmful impact on soil would also be reduced around the facilities through constant control of operational efficiency of installed electrostatic precipitators.

#### Catalytic effects

The health of the working and the youngest population will be improved, with all direct and indirect effects: reduction of health costs, both curative and preventive for all levels and age groups of population; increased efficiency of the working part of population; reduced pollution of agricultural surfaces; improved economy of the affected areas.

It is difficult to enforce environmental legislation in the private sector when the bulk of pollution is the responsibility of such a large public organisation as EPS. When EPS has cleaned up its operations, general enforcement will be easier to implement and better justified.

#### Sustainability

The Government Memorandum on budget for 2008 with projections for 2009 and 2010 shows that the Government commits itself to undertake gradual annual tariff adjustments in order to reach cost-recovering tariffs for electricity in compliance with the European levels, thus allowing EPS to raise finance for investment in environmental projects. The current round of investment through donor financing should therefore represent a one-off improvement to bring the Serbian power generating capacity to a point where sustainable further development is possible without subsidy or further donor intervention.

### 3.3 Results and measurable indicators

A new electro static precipitator procured and installed at TPP Morava that will significantly reduce atmospheric pollution in the region.

Measurable indicators will be:

- degree of compliance with a procurement and installation schedule to be developed with the tender documentation;

- Performance characteristics of the equipment and facilities provided by the supplier;
- National and EU standards concerning the quality of air;
- Number of operation staff trained.

### 3.4 Activities

#### Activities related to component

1. Manufacture and transport of equipment
2. Dismantling of old equipment
3. Installation of equipment
4. Commissioning with all accompanying tests
5. Maintenance crew trained; training of EPS staff for supervision and continuous maintenance of equipment and facilities
6. Continuous operation of the facility and analysis of operation results.

All activities should be carried out in accordance with the latest domestic and EU legislation.

### 3.5 Contracting arrangements

#### Component

This project will be implemented through a “turnkey” contract, according to FIDIC procedures to design, build and supervise the supply, commissioning and initial operation of new facilities and equipment with appropriate monitoring personnel supplied by EPS.

### 3.6 Conditionality and sequencing

It will be a condition that the technical specifications are prepared by the beneficiary. Implementation of the works must be overseen by a qualified supervising engineer. For operational reasons (the need to operate the power plants during the peak winter period) works to replace the ESPs must be undertaken during the planned plant shutdown periods.

### 3.7 Linked activities

Since 2000, EPS has taken a series of actions aimed at the improvement of operation of thermal units, as well as availability and reliability increase of units in operation.

By 2004, within the capital overhaul and regular overhauls, special attention was paid to the ESP, with the purpose to bring the existing ESP after ten-year operation to the maximum reliability level within the existing technologies. Since 2004, alignment of EPS operation with the legal regulations has been started.

Other projects were also launched related to environment improvement around the TPP and on a broader level:

- Capital overhauls of units A3 TPP Nikola Tesla A, reconstruction of ESP (€64.5 m CARDS 2002)
- Study of pollution from thermal power stations in Serbia and on pollution mitigation measures and their costs (€0.75 m CARDS 2003)
- Reconstruction of Unit A1, A2, A4 and A5 ESPs, TPP Nikola Tesla A between 2004-2007 (€58 m)
- Reconstruction of Unit A2, ESPs, TPP Kostolac A, 2006 year, financed by EAR.
- Environmental clean up measures (based on the study undertaken under the 2003 programme) (Electrostatic precipitators at Kostolac A and ash transport and storage at Nikola Tesla B power plant (€35 m).
- Ash handling system reconstruction with the thick slurry system at TPP Nikola Tesla B, through which reduction of ash dispersion from the ash disposal will be achieved. Project implementation has been started in 2007, financed by EAR.

### 3.8 Lessons learned

Experience on reconstruction executed so far has shown that equipment delivery period from abroad was prolonged, having an impact on the completion of the planned reconstruction implemented during overhauls, whose beginning and duration period is limited during the year. This is the reason why the tenders for procurement and delivery of the equipment necessary for the reconstruction should be planned earlier, since equipment comes from abroad.

Participation of domestic firms in the reconstruction was assessed as positive and they have demonstrated their technical ability to carry out the reconstruction to the end.



## 4 INDICATIVE BUDGET (AMOUNTS IN M€)

Activities	TOTAL PUBLIC COST	SOURCES OF FUNDING										
		EU CONTRIBUTION				NATIONAL PUBLIC CONTRIBUTION						PRIVATE
		Total	% *	IB	INV	Total	Type of cofinancing (J/P)**	% *	Central	Regional	IFIs	
Activity 1												
contract 1.	5.00	3.75	75%		4.00	1.25	P	25%	1.25			
TOTAL	5.00	3.75	75%		4.00	1.25	P	25%	1.25			

Amounts net of VAT

\* expressed in % of the Total Public Cost

## 5 INDICATIVE IMPLEMENTATION SCHEDULE

Contracts	Start of Tendering	Signature of contract	Project Completion
Contract 1	T + 1Q	T + 4Q	T + 10Q

## 6 CROSS CUTTING ISSUES

### 6.1 Equal Opportunity

The beneficiary will make sure its objectives, policies and interventions have a positive impact on and are in line with the main principles of gender equality. It will ensure equal opportunities clauses in all tendering material for procurement of equipment.

### 6.2 Environment

The objective of this project is to help Serbia to achieve compliance with the Environmental Acquis, as required by the Energy Community Treaty. This project will thus directly involve mainstreaming of environmental issues.

### 6.3 Minorities

As minorities and other vulnerable groups are usually the first to suffer from environmental degradation, and have the least chance of protecting themselves (e.g. by choosing residences in non-polluted areas), this project will improve their conditions in terms of reduced health hazards.

## ANNEX 1: LOGICAL FRAMEWORK MATRIX

Project is proposed by the Ministry of Mining and Energy, with the main beneficiary being the Public Enterprise Electric Power Industry of Serbia. Total value of the project amounts to 5 million euros, out of which 3.75 million euros is the proposed EU contribution and the remaining 1.25 million euros the national co-financing. This project is the last phase of an integrated programme for upgrading of the facilities at TPP Morava; this programme's objective is to rectify in a logical manner the legacy of many years of environmental degradation. The proposals that form the basis for this project have been scrutinised by the Ministry of Environment and Spatial Planning, an EIA has been conducted and approved and the various planning and construction permits have been issued. The appropriate technological solution has been chosen and approved. The project's main objective is to reduce atmospheric pollution generated by TPP Morava thus contributing to environmental harmonization and removal of serious health hazards by fulfilling the Directive 2001/80/EC for large combustion plants (modernizing specified Thermal Power Plants) and 96/62/EC. Project result includes procurement and installation of the new electrostatic precipitator at TPP Morava.

LOGFRAME PLANNING MATRIX FOR PROJECT FICHE		Project Title: Environmental Protection at EPS- Reconstruction of the Electrostatic Precipitator at TPP Morava	
		Total budget: 5,000,000 Euro	IPA budget: 3,750,000 Euro
OVERALL OBJECTIVE	Objectively verifiable indicators	Sources of Verification	
To reduce the levels of atmospheric pollution generated from TPP Morava, by installing an Electrostatic Precipitator thus contributing to environmental harmonisation and removal of serious health hazards	<p>Serbian practice in line with the EU norms.</p> <p>Reduction of the level of suspended particles in ambient air in the region surrounding the TPP</p> <p>Reduction of soil contamination</p> <p>Reduction of incidence of diseases associated with environmental contaminants</p>	<ul style="list-style-type: none"> <li>• EPS reports</li> <li>• Annual report of Environmental Protection Agency on air quality within the impact zone</li> <li>• Annual statistics report of the Ministry of Health on the number of people suffering from respiratory illnesses</li> </ul>	
SPECIFIC PROJECT PURPOSE	Objectively verifiable indicators	Sources of Verification	Assumptions
To fulfill the Directive 2001/80/EC for large combustion plants by modernising TPP Morava according to the EC Directive 96/62/EC	<p>Consistency of emissions control at TPPs over a longer period</p> <p>State of EPS installations and surrounding environment in comparison with the EU norms.</p> <p>Air quality indicators improved to the level defined by EU standards</p>	<ul style="list-style-type: none"> <li>• EPS / TPP technical reports</li> <li>• Reports of the Serbian Environmental Protection Agency</li> <li>• Annual Report on the State of Environmental Protection of the Electric Power Industry of Serbia</li> <li>• Local and nation media reports</li> </ul>	EU standards do not change while the project is being implemented.



RESULTS	Objectively verifiable indicators	Sources of Verification	Assumptions
A new electro static precipitator procured and installed at TPP Morava that will significantly reduce atmospheric pollution in the region	<p>Degree of compliance with a procurement and installation schedule to be developed with the tender documentation.</p> <p>Performance characteristics of the equipment and facilities provided by the supplier</p> <p>National and EU standards concerning the quality of air</p> <p>Number of operation staff trained</p>	<ul style="list-style-type: none"> <li>• Project reports</li> <li>• Contract with the supplier</li> <li>• Technical specification of the Supplier</li> <li>• Reports of the Serbian Environmental Protection Agency</li> <li>• Annual Report on the State of Environmental Protection of the Electric Power Industry of Serbia</li> <li>• Issued certificates to the operational staff in TPP Morava</li> </ul>	<ul style="list-style-type: none"> <li>• Continued support by top management of EPS for issues of environmental protection.</li> <li>• National Authorities committed to the fulfillment of EU standards in the environmental sector</li> <li>• Political stability and continuation of harmonization process with EU</li> </ul>
ACTIVITIES	Means	Means & Costs	Assumptions
<ul style="list-style-type: none"> <li>• Manufacture and transport of equipment</li> <li>• Dismantling of old equipment</li> <li>• Installation of equipment</li> <li>• Commissioning with all accompanying tests</li> <li>• Maintenance crew trained; training of EPS staff for supervision and continuous maintenance of equipment and facilities</li> <li>• Continuous operation of the facility and analysis of operation results.</li> </ul>		<p>5.00 m€</p> <p>This project will be implemented through a “turnkey” contract, according to FIDIC procedures to design, build and supervise the supply, commissioning and initial operation of new facilities and equipment with appropriate monitoring personnel supplied by EPS.</p>	<ul style="list-style-type: none"> <li>• Competent and qualified consulting and engineering companies interested and available for the project</li> <li>• Willingness of TPP Morava staff to apply new production &amp; control technologies</li> <li>• Equipments and the facilities available on the market</li> </ul>

## ANNEX 2: AMOUNTS (IN €) CONTRACTED AND DISBURSED BY QUARTER FOR THE PROJECT

Contracted	2009				2010				Total
	QR1	QR2	QR3	QR4	QR1	QR2	QR3	QR4	
Contract				3.75 m€					3.75 m€
Cumulated				3.75 m€					3.75 m€
Disbursed									
Contract				1.875m€		1.875m€			3.75m€
Cumulated				1.875m€		1.875m€			3.75 m€

## ANNEX 3: INSTITUTIONAL FRAMEWORK – LEGAL RESPONSIBILITIES AND STATUTES

Close cooperation of the PE EPS and the following institutions is necessary:

- Ministry of Mining and Energy;
- Ministry of Finance;
- Ministry of Environment and Spatial Planning;
- Municipalities and local communities on whose territory TPP is located.

## ANNEX 4: REFERENCE TO LAWS, REGULATIONS AND STRATEGIC DOCUMENTS

Reference list of relevant laws and regulations:

- Directive 2001/80/EC defining harmful substances emission limit values from large combustion plants;
- Directive 96/62/EC - framework, related to the quality of ambient air;
- Convention on Long-Distance Cross-Border Air Pollution;
- Contract on the Founding of SE Europe Energy Community, which came into force in July 2006, within which implementation of the Directive 2001/80/EC is planned;
- Law on Environmental Protection - Official Gazette RS № 135/04;
- Law on Integrated Pollution Prevention and Control - Official Gazette RS № 135/04;
- Draft Law on Air Protection;
- Energy Development Strategy by 2015 (Republic of Serbia);
- The Programme of Energy Development Strategy Implementation of the Republic of Serbia by 2015 for the period from 2007 and 2012;
- Sustainable Development Strategy of the Republic of Serbia
- The Programme of Energy Development Strategy Implementation of the Republic of Serbia by 2015 for the period from 2007 and 2012;



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## ANNEX 5: DETAILS PER EU-FUNDED CONTRACT (\*) WHERE APPLICABLE

### Component 1

A new electrostatic precipitators installed at TPP Morava, with output dust concentration of 50 mg/m<sup>3</sup>.

