JOINT IMPLEMENTATION PROJECT DESIGN DOCUMENT FORM
Version 01 - in effect as of: 15 June 2006

CONTENTS

SECTION A. General description of the project

A.1. Title of the project:

Rehabilitation of Dolna Arda Hydropower Cascade, Bulgaria
Revision 2
January 2007

A.2. Description of the project:

The main objective of the rehabilitation of Dolna Arda Hydropower Cascade is the generation of electricity based on renewable energy sources. The proposed project activity will result in emission reductions from the displacement of fossil fuel based generation capacity that would otherwise be generated and dispatched in Bulgaria.

The electricity generated by the project is expected to be about 63.6 GWh/a, based on hydro energy sources due to the addition of a new generating unit in HPP Studen Kladenets and the rehabilitation of three existing HPPs in the cascade.

As a result of the rehabilitation project, the efficiency of the existing hydropower plants (HPP Studen Kladenets, HPP Kardjali, and HPP Ivailovgrad) will be improved and their annual power generation will be increased by about 20.9 GWh/a.

The Dolna Arda Hydropower Cascade project consists of two parts:

1. Rehabilitation:
Rehabilitation is envisaged for the existing HPPs for the following main components:

- Turbines – new runners and wicket gate mechanisms; new butterfly valves and turbine governors; new oil-pressure systems and servo- motors;
- Generators – re-insulation of the rotor windings;
- Generators excitation systems – new static excitation systems;
- Relays protections – new digital relay protection systems;
- Monitoring and control – new monitoring and control systems will provide 4 control levels:
  1) National Dispatch Centre
  2) HPP
  3) Hydro Unit - turbine and generator
  4) Individual Facilities and Aggregates
- Electrical Part – new main transformers and new bus-bar systems in the 10.5 kV sections.

2. Additional generating Units in HPP Studen Kladenets:
Utilization of a part of the overflow from Studen Kladenets dam with construction of an additional Unit with Rated Output 16 MW at HPP Studen Kladenets;
Erection of the sixth small Unit with 1000 kW rated output for processing of the expected ecological water releases will enable a gradual improvement of the condition of the Arda river ecosystem in the sector between HPP Studen Kladenets and the tailrace of Ivailovgrad dam.

The NEK hydro power capacities are the most significant renewable energy sources for electricity generation in Bulgaria. The largest water storages in Bulgaria are built by the energy sector. The

reservoirs are designed for maximum utilization of the hydro potential as well as the required environmental safety.

The hydropower plants in the country, which are built close to the reservoirs, belong to NEK and are allocated mainly to four large cascades with a total installed capacity of 2,485.7 MW. Their average annual generation is about 2,900 GWh. The hydropower capacities in the cascades operate mainly for covering the peak load, for frequency adjustment and power exchange control.

In order to increase the generation from the HPPs and to reduce the quantities of emissions from pollutants and greenhouse gases from the thermal power plants, NEK implements projects for adding new hydropower capacities and the rehabilitation of the existing HPPs. These projects are carried out in compliance with the Flexible Mechanisms within the Kyoto Protocol, such as Joint Implementation Projects and undoubtedly have positive environmental effects.

A.3. Project participants:

Please list project participants and Parties involved in this section and provide contact information in Anex 1. Information shall be provided in the following tabular format.

Party involved *	Legal entity project participant (as applicable)	Please indicate if the Party involved wishes to be considered as project participant (Yes/No)
Republic of Bulgaria (Host Party)	• Natsionalna Elektricheska Kompania EAD (NEK)	Yes
Republic of Austria	• VA Tech Hydro GmbH&Co • Austrian JI/CDM Programme (ERU buyer)	No No

* Please indicate if the Party involved is a host Party.

A.4. Technical description of the project:

A.4.1. Location of the project:

A.4.1.1. Host Party(ies):

Republic of Bulgaria

A.4.1.2. Region/State/Province etc.:

The project will be carried out in the regions of Kardjali and Haskovo which are situated in the south-eastern part of Bulgaria.

A.4.1.3. City/Town/Community etc.:

The reservoirs and their power plants within the Dolna Arda Cascade are located along the river valley and close to the town of Kardjali, the village of Madjarovo and the Ivailovgrad community.

A.4.1.4. Detail of physical location, including information allowing the unique identification of the project (maximum one page):

The Arda River valley is located in the south-eastern part of Bulgaria. The Arda River springs from the middle part of the Rhodopi Mountains, collects the waters coming from several smaller rivers and flows into Maritsa River in the town of Odrin in Turkey.

The Dolna Arda Hydropower Cascade is situated in the middle and lower part of the River Arda valley. The cascade consists of three reservoirs and their HPPs, built in the period from 1958-1971. These are HPP Studen Kladenets, HPP Kardjali, and HPP Ivailovgrad, which are located below reservoirs with the same names.

Please refer to the following attachments for further information:
Annex 5: Bulgaria Map Dolna Arda Cascade
Annex 6: Scheme Dolna Arda Cascade
Annex 7: Longitudinal Section Dolna Arda Cascade

A.4.2. Technology(ies) to be employed, or measures, operations or actions to be implemented by the project:

All equipment to be utilized in the Dolna Arda Cascade is proven state-of-the-art technology. The technology transfer will be realized by an internationally reputable Austrian supplier group.

The technology to be employed by the Dolna Arda Rehabilitation Project is described for each of the existing hydro power stations Kardjali, Studen Kladenets and Ivailovgrad.

1. HPP KARDJALI
New mechanical components and equipment will be supplied for each unit for the proper rehabilitation of the mechanical part of the generating units.

1.1 Turbine runner Francis type:
The runner will be of Francis type; the turbine runner crown, runner band and the runner vanes will be cast in steel G-X4CrNi13-4 according to DIN EN 10283 welded together, heat treated, finish machined and statically balanced.

1.2 Electro-Hydraulic Governor:
The design of the hydraulic governor is based on a united rated output of 32 MW, Runner Diameter 2.260 mm, speed 250 rpm.

1.3 Main Inlet Valves-Butterfly Valves:
Butterfly Valves, designed as an emergency shut-down valve with counterweight for closing. The valve be opened by a hydraulic oil servomotor is actuated for operating be the existing hydraulic oil control unit.

1.4 Electric Power Generators:
For all 4 four generators the existing rotor poles will be dismantled and reinsulated.
Type hydro generator, vertical shaft, Russian type BGC 525/110-24

1.5 Excitation system:
The existing excitation system with exciter machine will be replaced with static thyristor excitation system for synchronous generators with slip rings. Excitation system THYNE 5 with digital (micro processor based) regulator type GMR3 for automatic mode (voltage regulation) and manual mode (rotor current regulation), with redundant rectifier unit.

1.6 Protection system:
Digital Protection Unit 1- Unit 4
Since the protective functions in the DRS are realized by software configuration it is possible to designate the functions to the DRS-COMPACT in a way to provide a backup system from each other. The configuration can be modified during design stage to a certain extent.
Digital Transformer Protection 1-2

1.7 Control System:
The power plant will be equipped with a control system providing 4 control levels:

- Dispatch Center control level (Joint control)
- Plant control level
- Unit control level (Unit controllers)
- Equipment control level

Dispatch center, plant and unit control level are integral part of the computerized control and monitoring system, the individual control level is using the control and supervision devices on the different equipment of the plant as e.g. turbine governor, excitation, AC distribution board etc.

1.8 AC/DC Switchboard:
MCC Common part=Main distribution board; MCC Unit 1, Unit 2, Unit 3, Unit 4; Turbine floor MCC, AC-distribution cubicles, DC-distribution cubicles

2. HPP STUDEN KLADENETS
New mechanical components and equipment will be supplied for each unit for the proper rehabilitation of the mechanical part of the generating units:

2.1 Turbine runner Francis type:
The runner shall be of Francis type while the turbine runner crown, runner band and the runner vanes will be cast in steel G-X4CrNi13-4 according to DIN EN 10283 welded together, heat treated, finish machined and statically balanced.

2.2 Electro-Hydraulic Governor:
The design of the hydraulic governor is based on a united rated output of 16 MW, Runner Diameter 2.105 mm speed 214.28 rpm.

2.3 Main Inlet Valves-Butterfly Valves:
Butterfly Valves, designed as an emergency shut-down valve with counterweight for closing. The valve be opened by a hydraulic oil servomotor is actuated for operating by the existing hydraulic oil control unit.

2.4 Electric Power Generators:
For all 4 four generators the stator winding is already refurbished therefore no activities on the stators of the generators are planned.
For all 4 four generators the existing rotor poles will be dismantled and reinsulated.
Type hydro generator, vertical, Russian type BGC 525/99-28

2.5 Excitation system:
The existing excitation system with exciter machine will be replaced with static thyristor excitation system for synchronous generators with slip rings. Excitation system THYNE 5 with digital (micro processor based) regulator type GMR3 for automatic mode (voltage regulation) and manual mode (rotor current regulation), with redundant rectifier unit.

2.6 Protection system:
Digital Protection Unit 1- Unit 3
Since the protective functions in the DRS are realized by software configuration it is possible to designate the functions to the DRS-COMPACT in a way to provide a backup system for each other. The configuration can be modified during design stage to a certain extent.
Digital Transformer Protection 1-2

2.7 Control System:
The power plant will be equipped with a control system providing 4 control levels:

- Dispatch Center control level (Joint control)
- Plant control level
- Unit control level (Unit controllers)
- Equipment control level

Dispatch center, plant and unit control level are integral part of the computerized control and monitoring system, the individual control level is using the control and supervision devices on the different equipment of the plant as e.g. turbine governor, excitation, AC distribution board etc.

2.8 AC/DC Switchboard:
MCC Common part consist of Main distribution board; MCC Unit1, Unit2, Unit3, Unit4; Turbine floor MCC AC-distribution cubicles, DC-distribution cubicles.

3. HPP IVAILOVGRAD
New mechanical components and equipment will be supplied for each unit for the proper rehabilitation of the mechanical part of the generating units.

3.1 Turbine Runners Francis Type:
The runner shall be of Francis type; the turbine runner crown, runner band and the runner vanes will be cast in steel G-X4CrNi13-4 according to DIN EN 10283 welded together, heat treated, finish machined and statically balanced.

3.2 Electro-Hydraulic Governor:
The design of the hydraulic is based on the following technical data:
Rated output 37.37 MW, Runner Dia. 3,700mm, speed 187.5 rpm

3.3 Main Inlet Valves-Butterfly Valves:
Butterfly Valves, designed as an emergency shut-down valve with counterweight for closing. The valve be opened by a hydraulic oil servomotor is actuated for operating be the existing hydraulic oil control unit.

3.4 Electric Power Generators:
The stator and rotor winding will be refurbished.
Type hydro generator, vertical, Russian type BGC 650/130-32
Number of Units - 3

3.5 Excitation system:
The existing excitation system with exciter machine will be replaced with static thyristor excitation system for synchronous generators with slip rings. Excitation system THYNE 5 with digital (micro processor based) regulator type GMR3 for automatic mode (voltage regulation) and manual mode (rotor current regulation), with redundant rectifier unit.

3.6 Protection system:
Digital Protection Unit 1- Unit 4
Since the protective functions in the DRS are realized by software configuration it is possible to designate the functions to the DRS-COMPACT in a way to provide a backup system for each other. The configuration can be modified during design stage to a certain extent.
Digital Transformer Protection 1-2

3.7 Control System:
The power plant will be equipped with a control system providing 4 control levels:

- Dispatch Center control level (Joint control)
- Plant control level
- Unit control level (Unit controllers)
- Equipment control level

Dispatch center, plant and unit control level are integral part of the computerized control and monitoring system, the individual control level is using the control and supervision devices on the different equipment of the plant as e.g. turbine governor, excitation, AC distribution board etc.

3.8 AC/DC Switchboard:
MCC Common part consists of main distribution board; MCC Unit1, Unit2, Unit3, Unit4; Turbine floor MCC AC-distribution cubicles, DC-distribution cubicles

4. Additional units in Studen Kladenets HPP

4.1 Unit No5
The power house will be expanded on the right side seen from downstream. New additional unit would be installed in Studen Kladenets HPP with main technical characteristics as follows:
One (1) Vertical Shaft Francis Turbine

- Maximum Output - 19.75MW
- Rated Output - 16MW
- Synchronous speed - 300 r.p.m
- Rated Net Head - 57.50 m
- Discharge at rated net head - 30.04 m3/s
- Guaranteed weighted average efficiency - 92.728 %

The turbine will be delivered with one set of wrenches, tools and special equipment and one set of spare parts. The unit will be delivered with the following additional mechanical equipment:

- Cooling water System;
- Drainage and Dewatering System;
- Compressed Air System;
- Bridge Crane Modification;
- Turbine Speed Governor;
- Main Inlet Valve;
- Hydro-mechanical Equipment – Penstock and Draft Tube Gate.

One (1) complete functional generator with a nominal power of 23MVA; cosφ = 0.85 and a nominal speed of 300rpm will be delivered. The new generator ratings calculated values are as follows:

- Rated apparent power - 23 MVA;

- Rated Voltage - 10.5 kV
- Rated current - 1265 A

The unit will be delivered with the following additional electrical systems and equipment: Excitation System; Protection System; Control System; Vibration Monitoring; 10.5 kV Switchgear; AC / DC Switchboard; Main Transformer; 110 kV Switchgear.

4.2 Auxiliary Unit and accessories

The auxiliary Unit with net output 1000kW will utilize the ecological waters which after the turbine will be discharge in the river bed, when Studen Kladenets HPP is not in operation.
The Unit will be delivered in set with all accessories and has the following technical characteristics:

One (1) Horizontal Francis Turbine with maximum turbine output 1330kW in set with Governor System, Hydraulic oil supply System and Inlet valve. The Francis Turbine has the following hydraulic characteristics:

- Design gross head 61.00 m
- Rated net head 60.00 m
- Rated discharge 2.00 m3/s
- Rated turbine output 1076 kW
- Turbine speed 1000 rpm

One (1) Electric Generator will be brushless synchronous type with built exciter machine and regulation system. The generator has the following technical data:

- Axis horizontal
- Maximum Turbine output 1330kW
- Rated output 1450 kVA
- Rated current 2064 A
- Power factor $\cos\varphi = 0.9$
- Normal voltage 0.40 kV +/- 5%
- Speed 1000 rpm

The unit will be delivered also with a set of LV electrical equipment. The set include complete control, protection, indication, alarm, measuring and data acquisition system.

A.4.3. Brief explanation of how the anthropogenic emissions of greenhouse gases by sources are to be reduced by the proposed JI project, including why the emission reductions would not occur in the absence of the proposed project, taking into account national and/or sectoral policies and circumstances:

Reduction in CO2 emissions by the Dolna Arda rehabilitation project is the result of displacement of generation from fossil-fuel thermal plants that would have otherwise delivered power to the Bulgarian electricity grid. At present, 53.6 % of the installed generation capacity is thermal, burning brown coal, steam coal, lignite, heavy oil and natural gas.

The Dolna Arda rehabilitation project is expected to generate additional electricity of about 63.6 GWh/a, based on hydro energy sources due to the addition of a new generating unit in HPP Studen Kladenets and due to the rehabilitation of the existing HPPs in the cascade. This would result in a reduction of an estimated 267,465 t of CO2-equivalent between 2008 and 2012.

The selected baseline methodology for the Dolna Arda rehabilitation project is based on the 'Marginal plant only (Least cost dispatch analysis)'. This type of approach is seen to be the most accurate when analyzing which unit will be replaced by a new capacity.

The least cost dispatch approach analyses the electricity sector on the basis of electricity demand, price and cost estimations and gives the marginal plant in each hour of the year. For the analyses required for the Dolna Arda Cascade Joint Implementation Project, the computer model 'Integrated Resource Planning Manager Model' (IRP Manager Model) is available at NEK EAD. The IRP model provides and co-ordinates an expansive „Tool Box" of integrated resource planning capabilities, including chronological simulation of demands and resources, automated resource strategy development, decision analysis, and complete forecasts of impacts from all perspectives.

A.4.3.1. Estimated amount of emission reductions over the crediting period:

Table A.4.3.1.1. Total emission reductions 2008 – 2012

Please indicate the length of the crediting period and provide estimates of total as well as annual emission reductions. Information shall be provided using the following tabular format.

	Years
Length of the crediting period	5
Year	Estimate of annual emission reductions in tonnes of CO_2 equivalent
2008	38 285
2009	46 147
2010	56 490
2011	63 575
2012	62 967
Total estimated emission reductions over the crediting period (tonnes of CO_2e)	267 465
Annual average of estimated emission reductions over the crediting period (tonnes of CO_2e)	53 493

A.5. Project approval by the Parties involved:

The Bulgarian Ministry of Environment and Water fully supports the Dolna Arda Rehabilitation Project and has accepted the project as a Joint Implementation project in the context of the Memorandum of Understanding signed between the Republic of Bulgaria and the Republic of Austria. The respective Letter of Approval was issued on October 10, 2006 which can be found in Annex 8.
The Letter of Approval from the Austrian Focal Point is still pending.

SECTION B. Baseline

B.1. Description and justification of the baseline chosen:

Marginal plant only (Least cost dispatch analysis)

The least cost method assumes that the plants running at the margin (with the highest cost) will be the first to be replaced. The method shows the generation by each plant for each hour (or group of hours) in the year. The assumption is that the introduction of the new capacity will push out plants that are currently operating at the margin in the load duration curve. This analysis requires an evaluation of the last unit(s) to be switched on for each hour (or group of hours) in the year and thus the hourly marginal emissions rate. This type of approach is thought to be the most accurate in terms of which unit will actually stop generating.

The chosen baseline methodology analyses the electricity sector on the basis of electricity demand, price and cost estimations and gives the marginal plant in each hour of the year. For the analyses necessary for the Dolna Arda Cascade JI Project, a computer model named "IRP Manager" is available. The Integrated Resource Planning Manager Model (IRP Manager Model) provides and co-ordinates an expansive „Tool Box" of integrated resource planning capabilities, including chronological simulation of demands and resources, automated resource strategy development, decision analysis, and complete forecasts of impacts from all perspectives.

B.2. Description of how the anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the JI project:

The proposed baseline methodology for the Dolna Arda rehabilitation project is the 'Marginal plant only (Least cost dispatch analysis)'. This type of approach is seen to be the most accurate when analyzing which unit will be replaced by a new capacity.

The least cost dispatch approach analyses the electricity sector on the basis of electricity demand, price and cost estimations and gives the marginal plant in each hour of the year. For the analyses required for the Dolna Arda Cascade Joint Implementation Project, the computer model 'Integrated Resource Planning Manager Model' (IRP Manager Model) is available at NEK EAD. The IRP model provides and co-ordinates an expansive „Tool Box" of integrated resource planning capabilities, including chronological simulation of demands and resources, automated resource strategy development, decision analysis, and complete forecasts of impacts from all perspectives.

1) Baseline Scenario
The Baseline Scenario describes how the Bulgarian electricity market would develop in absence of the proposed Dolna Arda rehabilitation project. The analysis of the future electricity demand shows that there is a significant difference in the additional electricity demand in the 2 scenarios (Maximum and Minimum). While in the Minimum scenario there will be an increase in demand of about 9,000 GWh between 2000 and 2020, in the Maximum scenario the increase in demand will be about 14,400 GWh during the same period.

This difference between the 2 scenarios will of course have an influence on the marginal load and most probably also on the least cost expansion plan. So a decision has to be made regarding the scenario that is used for the further analyses in this baseline study.

In the Minimum scenario, it is likely that the existing power plants will provide a majority of the electricity demand and only a limited number of new power plants are necessary to meet the demand. In the Maximum scenario, on the contrary, the demand increase for the same period is much larger, thus requiring more electric capacity.

Power plants currently on the margin are mainly coal-fired power plants with rather low efficiencies. When demand is increased, the following developments are possible:

- Existing plants will have a higher load factor, which increases overall efficiency of the plants and therefore also decreases the specific CO2 emission factor per MWh.
- New plants will be built to cover additional demand. Options for new plants will mainly include coal- and gas-fired units, which have lower specific CO2 emission factors than the existing coal-fired power plants.

These potential developments show the tendency that a higher demand will lead to lower specific CO2 emission factors for the marginal plants. In order to be conservative in the assumptions in this baseline study, the Maximum scenario is taken as a basis for the further calculations. In the Monitoring Plan for the Dolna Arda Cascade Project, the marginal plant in each hour of the year will be analyzed based on the actual dispatch order. Therefore any differences between the electricity demand assumed in the baseline study and real electricity demand and the corresponding changes in the marginal load will be taken into account in the Monitoring Plan.

The following list summarizes the main assumptions for the Least-Cost Development Plan for the Bulgarian Electric Power System, combining electricity demand, current structure of electricity supply and options for capacity extension/rehabilitation:

Electricity demand:
- Electricity demand will increase from 42,850 GWh in 2005 to about 44,465 GWh in 2012 (+3.8%).

Decommissioning:
- Units No. 3 & 4 of Kozloduy NPP by end of 2006;
- TPP Brikel by the end of 2010;
- TPP Maritsa 3 by the end of 2010;
- In Bobov Dol TPP, one coal-fired unit will be decommissioned in 2008, a second one in 2011, and a third one in 2014.

Commissioning:
- HPP Tsankov Kamak, 80 MW, in 2009;
- New TPP burning indigenous lignites, 600 MW, in 2008/2009;
- Expansion of cogeneration PPs, 130 MW, in 2009;
- New NPP Belene, 1,000 MW, 2012.

Rehabilitation:
- TPP Varna
- TPP Maritsa Iztok #2 part (150MW)
- TPP Maritsa Iztok #2 part (210MW)
- TPP Maritsa Iztok #3
- TPP Rousse

- The power generation of the pumped storage hydro power plant Chaira will increase due to the Yadenitsa reservoir project, which foresees the construction of an additional lower compensation basin by 2010.

2) Project Scenario
The project scenario in the Dolna Arda Cascade Joint Implementation Project includes the rehabilitation of three existing hydropower plants (HPP Studen Kladenets, HPP Kardjali, and HPP Ivailovgrad) and the installation of an additional generating unit at HPP Studen Kladenets. The project scenario considers the improved efficiencies of the refurbished plants and the associated energy generation increase as well as the additional generation due to the installation of a new unit at HPP Studen Kladenets. The Dolna Arda Hydropower Cascade Rehabilitation project is considered as an energy capacity that will be part of the Bulgarian Electric Power System (EPS).

- Dolna Arda Cascade capacity before project 259.1 MW
- Increase in capacity due to rehabilitation of 3 HPPs 10.6 MW
- Increase in capacity due to installation of new unit 19.75 MW
- Total increase in capacity due to project 30.35 MW
- Total increase in power generation due to project 63.6 GWh/a

3) Emission Reductions due to the project
The calculation of emission reductions requires the identification of the power plants whose electricity generation would be displaced by the Dolna Arda Cascade JI Project.

The output of the IRP (Integrated Resource Planning) Manager model reports 4 main marginal power plants in the period under consideration – TPP Bobov dol, TPP Varna, TPP Maritsa Iztok # 3 and TPP Rousse (condensation plant). Usually within one working hour the EPS has one marginal power plant. However, from an annual perspective, the IRP model reports 4 marginal power plants, and that is due to their varied load schedules and differing maintenance programs with regard to their duration, scope of repair works and time of year that they are carried out.

The total emission reductions in the period 2008-2012 achieved due to the implementation of the Dolna Arda Cascade JI Project amount to 267,465 tons CO2.

4) Additionality assessment / Removal of investment barriers
The planned refurbishment of the Dolna Arda Cascade will increase the efficiency of the Cascade by more than 5%. Therefore, the refurbishment of Dolna Arda represents an important step in optimizing the efficiency in renewable energy generation in Bulgaria.

For several years, NEK has been looking for a financial set up for the Dolna Arda rehabilitation project. From the very beginning, potential suppliers from Austria were requested to provide a financing package covering the entire Project in addition to the supplies and services from Austria.

Therefore, VA TECH FINANCE took over the role as an arranger for the financial set-up of the transaction and co-ordinator with Export Credit Agencies (ECAs), International Financial Institutions (IFIs), Ministries, commercial banks and various other institutions.

In view of the high total project cost, the 5 years construction period in addition to the very long credit repayment period, it is clear that without the involvement of ECAs the financial set-up will not be bankable. Currently, the cover policy of Austrian Export Promotion Authority (OeKB) for Bulgaria only

allows a maximum covered credit of MEUR 20 with a maximum repayment period of 12 years based on a first class Bulgarian bank guarantee or a State Guarantee.

Besides the ECA approach, EBRD (European Bank for Reconstruction and Development) and EIB (European Investment Bank) were contacted in order to follow a different way for financial set-up. In view of the fact that a State Guarantee would eventually have been a prerequisite for EBRD or EIB involvement for this Austrian-Bulgarian bilateral project, the EBRD/EIB approach was not followed intensively. Furthermore, the Austrian ECA is well known for its flexible attitude and fast decision making process which was an additional reason to follow the ECA set-up.

An inner-Bulgarian financing could not be considered as a 16 years door-to-door tenor is not bankable on the Bulgarian finance market. According to the information prevailing, such a tenor has never been achieved in Bulgaria, not even on the bond market. All deals above 5 years are already considered as extremely long for Bulgarian transactions! In addition to the extremely long tenor, the great amount and much higher local interest rate would also have been an obstacle for inner-Bulgarian financial set-up of the project.

At the moment, the financing process is blocked by limited ECA cover facilities (it should also be mentioned that so far only OeKB accepts NEK as clean corporate risk, no other ECA has ever accepted NEK risk). Furthermore, an IFI approach is considered not appropriate and an inner Bulgarian financing is definitively impossible, in particular due to the requested long tenor and the high amount of the loan.

To overcome this investment barrier and to set up a financing scheme, generation and sale of Emission Reduction Units (ERUs) could play a substantial role in the transaction. Based on the environmental benefits by the project, the Austrian Ministry of Finance and OeKB are expected to declare their preparedness for a higher cover amounting to MEUR 60 (most probably with reinsurance of other ECAs).

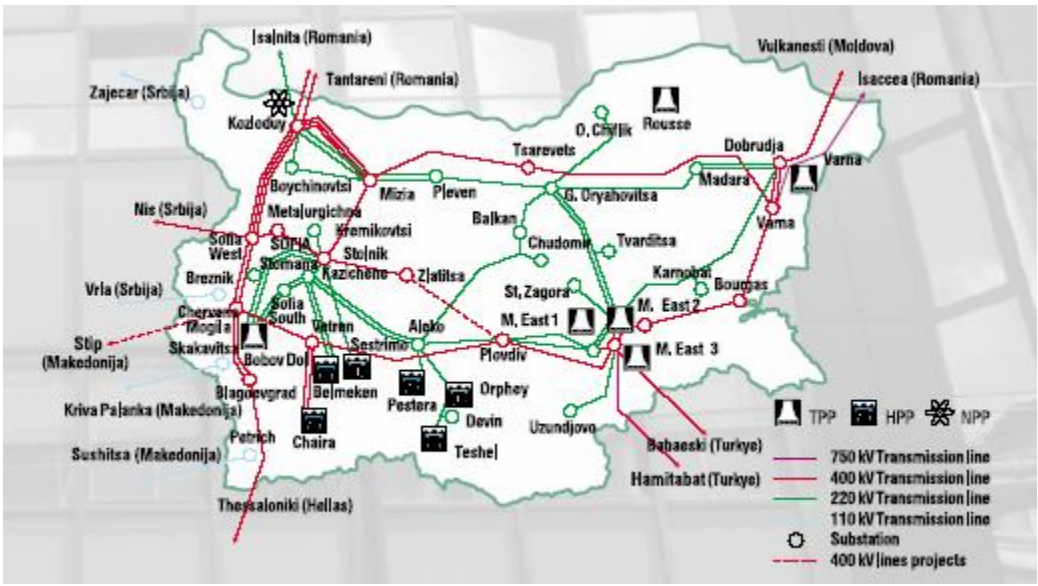
It is understood by the Austrian Export Promotion Authority that a realization as JI Project is a precondition for cover of OeKB. Only based on this set-up the Austrian ECA would be prepared to grant such a high guarantee, which represents 3 times its previous maximum cover policy for Bulgaria. Therefore, the JI approach can be considered a pre-condition for the realization of the Dolna Arda rehabilitation project.

It is intended that earnings from NEK out of the sale of ERUs to the Austrian Joint Implementation Program could serve as cash basis on an escrow account for the repayment of interest and principal from 2008 on. This instrument will serve as essential collateral for the whole project set-up and, therefore, serves as a crucial leverage for the entire realization of Dolna Arda Cascade JI Project.

So the JI set-up is intended to first of all initiate the go-decision from ECA point of view. As soon as a substantial ECA involvement can be expected, the JI set-up shall improve the attractiveness of the project for commercial banks, needed for financing of non ECA-covered credit facilities. Therefore, it is clear that without the JI-approach a realization of the Dolna Arda rehabilitation Project would be unrealistic.

B.3. Description of how the definition of the project boundary is applied to the project:

The project boundary is defined by emissions sources directly affected by the project operation of the Dolna Arda Cascade project. Since all power plants at the Bulgarian EPS are potentially affected by the operation of the Dolna Arda Cascade Project, the project boundary comprises the whole Bulgarian Electric Power System (EPS). Therefore, the project boundary is defined as the Bulgarian EPS which is shown in the following figure.



B.4. Further baseline information, including the date of baseline setting and the name(s) of the person(s)/entity(ies) setting the baseline:

Please see the attached Baseline Study (Annex 3) for further information.

Date of completion of the Baseline Study:
July 2005

Name(s) of the person(s)/entity(ies) setting the baseline:
Michael Haslinger
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Pöyry Energy GmbH is not a project participant.

SECTION C. Duration of the project / crediting period

C.1. Starting date of the project:

September 2005
A detailed project schedule is enclosed in Annex 11: Time Schedule Dolna Arda

C.2. Expected operational lifetime of the project:

30 years

C.3. Length of the crediting period:

5 years (2008-2012)

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

Please see the attached Baseline Study (Annex 3) and Monitoring Plan (Annex 4) for a detailed description of the methodology used for calculating emission reductions as well as the reasoning utilized in selecting this methodology.

D.1.1. Option 1 – Monitoring of the emissions in the project scenario and the baseline scenario:

D.1.1.1. Data to be collected in order to monitor emissions from the project, and how these data will be archived:

ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

As the project produces no emissions, no data has to be collected to monitor emissions. Electricity generation data from the Dolna Arda Cascade is necessary to calculate baseline emissions. The monitoring system for the generation data is described in the Monitoring Plan. Not applicable, as the hydro power project produces no emissions, no data has to be collected to monitor emissions.

D.1.1.2. Description of formulae used to estimate project emissions (for each gas, source etc.; emissions in units of CO_2 equivalent):

Not applicable.

D.1.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions of greenhouse gases by sources within the project boundary, and how such data will be collected and archived:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
113.1	*GDAC: Generation Dolna Arda Cascade from HPP Studen Kladenets (Units 1-5), HPP Kardjali (Units 1-4) and HPP Ivailovgrad (Units 1-3).*	*NEK EAD*	*MWh*	*(m)*	*Hourly*	*100%*	*Electronic/paper*	*Data are obtained for each unit separately from the metering systems of the power plants.*
113.2	*EC1: Efficiency Coefficient before rehabilitation for each unit separately, except for the new Unit 5 in Studen Kladenets*	*NEK EAD*		*(m) and (c)*	*Once*	*100%*	*Electronic/paper*	*The Efficiency Coefficients have to be calculated for each unit separately once before rehabilitation*

113.3	*EC2: Efficiency Coefficient after rehabilitation for each unit separately, except for the new Unit 5 in Studen Kladenets*	*NEK EAD*		*(m) and (c)*	*Once*	*100%*	*Electronic/paper*	*The Efficiency Coefficients have to be calculated for each unit separately once after rehabilitation.*
113.4	*PC: Plant Code for Marginal and Next Marginal Plant*	*National Dispatch Center (NDC)*	*Number*	*(m)*	*hourly*	*100%*	*Electronic/paper*	*Based on real time dispatch order, reported by NDC*
113.5	*CMP: Capacity of Marginal Plant*	*National Dispatch Center (NDC)*	*MW*	*(m)*	*hourly*	*100%*	*Electronic/paper*	*Based on real time dispatch order, reported by NDC*
113.6	*GMP: Generation of Marginal Plant*	*National Dispatch Center (NDC)*	*MWh*	*(m)*	*hourly*	*100%*	*Electronic/paper*	*Based on real time dispatch order, reported by NDC*
113.7	*EF: Emission Factor for Marginal and Next Marginal Plant*	*NEK - EAD*	*tCO2/GWh*	*(m) and (c)*	*Monthly*		*Electronic/paper*	*Individual Emission Factor for each power plant*

D.1.1.4. Description of formulae used to estimate baseline emissions (for each gas, source etc.; emissions in units of CO_2 equivalent):

The following calculations are used for the estimation of the baseline emissions:

EC1 and EC2:
The efficiency coefficients (EC1 and EC2) are determined by the thermo-dynamic method according to IEC Standard 41 – "Field acceptance tests to determine the hydraulic performance of hydraulic turbines, storage pumps and pump-turbines." See Annex 4b Monitoring Plan for a detailed description of the efficiency measurement method.

EF: Emission Factor for Marginal and Next Marginal Plant

Each thermal power plant has its own specific Emission Factor according to its specific energy consumption, efficiency and type of fuel. The specific heat rates are manually calculated for each month at each TPP. The carbon contents are measured accordingly. Until the 10th of the following month the Project Operator NEK EAD and the NDC will receive the calculated plant specific emission factors for each month. The data is transferred via Email. Please refer to Annex 4a and 4b Monitoring Plan for a detailed description of the EF calculation.

D. 1.2. Option 2 – Direct monitoring of emission reductions from the project (values should be consistent with those in section E.):

Not applicable.

D.1.2.1. Data to be collected in order to monitor emission reductions from the project, and how these data will be archived:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

D.1.2.2. Description of formulae used to calculate emission reductions from the project (for each gas, source etc.; emissions/emission reductions in units of CO_2 equivalent):

>>

D.1.3. Treatment of leakage in the monitoring plan:

No leakage is taken into account for this hydro power project.

D.1.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project:								
ID number *(Please use numbers to ease cross-referencing to D.2.)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

D.1.3.2. Description of formulae used to estimate leakage (for each gas, source etc.; emissions in units of CO_2 equivalent):

No leakage considered.

D.1.4. Description of formulae used to estimate emission reductions for the project (for each gas, source etc.; emissions/emission reductions in units of CO_2 equivalent):

Plants running at the margin (with the highest cost) will be the first to be replaced. Without the implementation of the Dolna Arda Cascade Project, the marginal plant (and in some cases the next marginal plant) would increase its generation by the same quantity that the Dolna Arda Cascade generates in that hour.

The amount of Emission Reduction Units (ERUs) is calculated by multiplying the incremental generation of the marginal plant and the next marginal plant by the plant specific emission factors.

For detailed description of formulae used to estimate emission reductions for the project please refer to Worksheet 18 in the Annex 4b Monitoring Plan.

D.1.5. Where applicable, in accordance with procedures as required by the host Party, information on the collection and archiving of information on the environmental impacts of the project:

Not applicable

D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:		
Data *(Indicate table and ID number)*	Uncertainty level of data (high/medium/low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
113.1	*low*	*1.) Electric meters will be maintained in good repair and subjected annually to testing and calibration in conformity with the technical requirements for measurement accuracy assurance.* *2.) The monthly invoices for electricity sold to the Grid Operator will be used in monitoring the performance of Project electric meters.*
113.2	*low*	*The efficiency coefficient EC1 is measured once before rehabilitation and calculated and determined based on the thermo-dynamic method according to IEC Standard 41 – "Field acceptance tests to determine the hydraulic performance of hydraulic turbines, storage pumps and pump-turbines."*
113.3	*low*	*The efficiency coefficient EC2 is measured once after rehabilitation and calculated and determined based on the thermo-dynamic method according to IEC Standard 41 – "Field acceptance tests to determine the hydraulic performance of hydraulic turbines, storage pumps and pump-turbines."*
113.4	*low*	*Not necessary, data from the real time dispatch order reported by National Dispatch Center (NDC) will be used*
113.5	*low*	*Not necessary, data from the real time dispatch order reported by National Dispatch Center (NDC) will be used*
113.6	*low*	*Not necessary, data from the real time dispatch order reported by National Dispatch Center (NDC) will be used*
113.7	*low*	*1.) At TPPs, wherever there are installed gas analyzers for direct determining of CO2 emissions, the emission factor per hour is received from the data logger of the measuring system. Depending on the electricity generated by the power unit, the weighted average emission factor of the marginal power unit is calculated for the respective month. Once in a year, the gas analyzer and data logger are subjected to mandatory testing and calibration outside the TPP beside the regular calibration and testing of the instruments in compliance with the manufacturer's instructions.* *2.) At TPP's without gas analyzers the monthly emission factor is calculated on the basis of a procedure according to which the needed data will be obtained from the averaged monthly determination of the technical parameters of a TPP together with the data from analyses of the element composition of the fuels used. NEK will exercise quality control of the technical data from the TPP and will verify them by computation from the fuel analysis. A second data verification will be done on the basis of direct gas measurements carried out by the Regional Inspectorate of Environment and Water.*

Please refer to Annex 4b Monitoring Plan (Workbook in Annex 1 of the Monitoring Plan).

D.3. Please describe the operational and management structure that the project operator will apply in implementing the monitoring plan:

It is the responsibility of NEK EAD to develop and implement a management and operational system that meets the requirements of this Monitoring Plan. This Monitoring Plan establishes the framework for these requirements.

Data handling:
A transparent system for the collection, computation and storage of data, including adequate record keeping and data monitoring systems, must be established. There must be clarity in terms of the procedures and protocols for the collection and entry of data, use of workbooks and Worksheets and any assumptions made, so that compliance with requirements can be assessed by a third party. Stand-by processes and systems, e.g. paper based systems, must be used to provide for the possibility of system failures. The record keeping system must provide a paper trail that can be easily audited.

Quality assurance:
The Project Operator must designate a competent manager (the Manager) who will be in charge of, and accountable for, the generation of data, monitoring, record keeping, and computation of ERs, and of audits and verification. He/she shall officially sign all worksheets.
The Manager shall establish well-defined protocols and routine procedures, with professional data entry, extraction and reporting procedures, aimed at facilitating the auditor and verifier work. The more organized and transparent the organization the easier will be to track, monitor, verify and audit.

Proper management processes and systems records must be kept by the Project Operator, as the auditors will request copies of such records to judge compliance with the required management systems. Auditors will accept only one set of official information, and any discrepancies between the official, signed records and on-site records will be questioned.

Reporting:
The Project Operator will prepare reports, as needed, for audit and verification purposes.
The Project Operator should prepare a brief Annual Emission Reduction Report including information on overall project performance, emission reductions generated and information on adjustment of key Monitoring Plan assumptions, calculation methods and other amendments of the MP and the monitoring system.

Training:
It is the responsibility of the Project Operator to ensure that the required capacity is available and that his operational staff participates in internal training to enable them to undertake the tasks required by this MP. Initial training must be provided to the staff before the Project starts operating and generating ERs.

Please refer the Annex 4a Monitoring Plan for a more detailed description of the Management and Operational System that must be established for accurate monitoring of emission reductions.

D.4. Name of person(s)/entity(ies) establishing the monitoring plan:

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Pöyry Energy GmbH is not a project participant.

SECTION E. Estimation of greenhouse gas emission reductions

E.1. Estimated project emissions:

Table E.1.1 Project emissions 2008 – 2012

	2008	2009	2010	2011	2012	2008-2012
Project emissions (in kt CO_{2e})	28 556	26 510	27 362	28 495	23 186	134 109

A detailed calculation is shown in the Annex 3a Baseline Study Chapter 8 (Project scenario).

E.2. Estimated leakage:

No leakage.

E.3. The sum of E.1. and E.2.:

Table E.3.1 Sum of project emissions and leakage 2008 – 2012

	2008	2009	2010	2011	2012	2008-2012
Project emissions (in kt CO2e)	28 556	26 510	27 362	28 495	23 186	134 109
+ Leakage (in kt CO2e)	0	0	0	0	0	0
Sum E.1. and E.2.	28 556	26 510	27 362	28 495	23 186	134 109

E.4. Estimated baseline emissions:

Table E.4.1 Baseline emissions 2008 – 2012

	2008	2009	2010	2011	2012	2008-2012
Baseline emissions (in kt CO_{2e})	28 595	26 556	27 418	28 558	23 249	134 376

A detailed calculation is shown in Annex 3a Baseline Study Chapter 7 (Baseline scenario).

E.5. Difference between E.4. and E.3. representing the emission reductions of the project:

Table E.5.1 Emission reductions 2008 – 2012

	2008	2009	2010	2011	2012	2008-2012
Emission reductions (in kt CO2e)	38.285	46.147	56.490	63.575	62.967	267.465

E.6. Table providing values obtained when applying formulae above:

Table E.6.1 Table providing all inputs for the calculation of the emission reductions 2008 – 2012

The result of the application of the formulae above shall be indicated using the following tabular format.

Year	Estimated project emissions (tonnes of CO2e)	Estimated leakage (tonnes of CO2e)	Estimated baseline emissions (tonnes of CO2e)	Estimated emission reductions (tonnes of CO2e)
2008	28 556 000	0	28 595 000	38 285
2009	26 510 000	0	26 556 000	46 147
2010	27 362 000	0	27 418 000	56 490
2011	28 495 000	0	28 558 000	63 575
2012	23 186 000	0	23 249 000	62 967
Total (tonnes of CO2e)	134 109 000	0	134 376 000	267 465

SECTION F. Environmental impacts

F.1. Documentation on the analysis of the environmental impacts of the project, including transboundary impacts, in accordance with procedures as determined by the host Party:

From an environmental point of view, the project will only have minor impacts. The project has been approved by the Regional Inspectorate in Haskovo based on an Environmental Audit which was finalized in August 2005.

After approval by the Regional Inspectorate, a Decision No.HA-57-P/2005 was issued based on which the project should not be subject to a further EIA report. Please refer to the following attachments for further information:
Annex 9: Decision MOEW Regional Inspectorate Haskovo
Annex 10: Dolna Arda Environmental Audit

The results of the Environmental Audit have been summarized and are structured in environmental effects during construction and during project lifetime. The listed regulations are available at NEK, Mr, Christo Schwabski, email: hshvabski@nek.bg and may be obtained on request.

Table F.1.1 Environmental effects during construction

AIR	**MITIGATION MEASURES:** The engineering design shall provide for measures appropriate to reduce air polluting emissions by using modern technical equipment and technologies, namely: o special trucks spraying water over service roads in dry weather and/or heavy traffic conditions; o explosion dust treatment through water spraying; o increased concentrations of harmful gas emissions from the use of diesel engine vehicles and building machinery on the site of HPP Studen Kladenets. To reduce specific emissions by 25-35%, modern internal combustion engine controllers shall be used; o maintenance of building machinery and equipment at motor depots aimed at reducing specific

	emissions of gas and soot from diesel engines. **RELEVANT REGULATION:** o Framework Directive 96/62/EC on Ambient Air Quality Assessment and Management o Environment Protection Act (State Gazette No.91/25.09.2002) o Clean Air Act (SG No. 45/2000 with amendments (SG No.27/2000) o Regulation No.7 of 3 May 1999 on Ambient Air Quality Assessment and Management (SG 45/1999) o Directive 1999/30/EC relating to limit values for sulphur dioxide, nitrogen dioxide and fine particulate matter and lead in ambient air ….. o Regulation No.9 of 3 May 1999 on imit values for sulphur dioxide, nitrogen dioxide and fine particulate matter and lead in ambient air Does the project go beyond these minimum requirements? Yes: The Dolna Arda Cascade JI Project is based on reliable international, Austrian, German, European and US rates and standards. Furthermore the Project is in compliance with all applicable EU regulations and directives relating to environment, and therefore it goes beyond the requirements of the Bulgarian law on environment.
WATER	**MITIGATION MEASURES:** o During the construction of the extension of HPP Studen Kladenets construction works effluents shall pass through a mechanical settler prior to being discharged into the river Arda to avoid any increased concentrations of undissolved particles in the river; o Determination of the amount and category of waste and sewage water from all sources and submission of a concept design of sewage water treatment during the refurbishment works at the HPP and construction works at HPP Studen Kladenets; o Daily inspections of the technical condition of building machinery and equipment (for oil spills). Building machines and vehicles in bad repair shall not be allowed to operate; o Monitoring of storage facilities for fuel and lubricating oils in order to prevent occasional spills of fuel. **RELEVANT REGULATION:** o Directive 2000/60/EC establishing a framework for Community action in the field of water policy, amended by Decision No 2455/2001/EC establishing the list of priority substances in the field of water policy o Water act (State Gazette No. 67/27.1999, effective 28.01.2000, last amended and supplemented, SG No. 74/2002, SG No. 91/2002, effective 1.01.2003. o Regulation No. 6 of 9 November 2000 on the Limit Values for Admissible Contents of Dangerous and Harmful Substances in the Waste Water Discharged in the Water Bodies Promulgated (State Gazette No. 97/28.11.2000) o Directive 78/695/EEC on the quality of fresh waters needing protection or improvement in order to support fish life and Directive 79/923/EEC on the quality required of shellfish waters o Regulation No. 4 of 20 October 2000 on the quality of waters supporting fish and shellfish organisms' life (State Gazette No. 88/27.10.2000) o Directive 76/464/EEC on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community, amended by Directive 91/692/EEC, amended by Directive 2000/60/EC establishing a framework for Community action in the field of water policy o Regulation No. 6 of 9 November 2000 on the Limit Values for Admissible Contents of Dangerous and Harmful Substances in the Waste Water Discharged in the Water Bodies

	promulgated (State Gazette No. 97/28.11.2000) Does the project go beyond these minimum requirements? Yes: The Dolna Arda Cascade JI Project is based on reliable international, Austrian, German, European and US rates and standards. Furthermore the Project is in compliance with all applicable EU regulations and directives relating to environment, and therefore it goes beyond the requirements of the Bulgarian law on environment.
WASTE	**MITIGATION MEASURES:** o Waste generated from the rehabilitation will be handled by the Waste Management Plan for the three power plants during their maintenance outages; o Waste material generated from the construction works carried out for the extension and the administrative building of HPP Studen Kladenets shall be collected and temporary stored, transported and disposed in accordance with the requirements of the Waste Management Act; o Ground and rock material that is in excess or not fit for construction purposes shall be transported by motor vehicles to specially designed landfills; o Domestic waste shall be disposed in a special dump area to be used during the construction phase and the operation phase and motor vehicles shall be used to transport the waste thereto; o Spent fuel and lubricants shall be collected in special tanks appropriately lined to protect the soil and water from contamination; o The technical design shall specify the time intervals and routes for the transportation of such waste to the recycling facilities; o The technical design shall specify temporary storage spaces for scrap materials where they will be stored before being sent for reprocessing; o During the phase of the technical design there shall be submitted technical solutions for the management of all types of waste including generation, collection, transportation, burial (site, technology, use of existing dumps close to the project site, etc.). **RELEVANT REGULATION:** o Directive 75/442/EEC on waste o Law on Waste Management (State Gazette No 86/2003); o Regulation No 10 on the filling out of the report and the waste management information documents (State Gazette No 151/1998); o Directive 91/689/EEC on the hazardous waste o Law on Waste Management (State Gazette No 86/2003); o Regulation on the requirements for treatment and transportation of industrial and hazardous waste (adopted with Decree of the Council of Ministers No 53/1999; State Gazette No 29 /1999); o Regulation (EC) No 2557/2001 of 28 December 2001 amending Annex V of Council Regulation (EEC) No 259/93 on the supervision and control of shipments of waste within, into and out of the European Community o Law on Waste Management (State Gazette No 86/2003); o Regulation for the cases when a permit is required for the import, export and transportation of waste and the conditions and order of the issuing the permit (State Gazette No 6/2000). The regulation defines also the cases when a bank guarantee or insurance is required. o Directive 75/439/EEC on waste oils o Regulation on the requirements for the treatment and the transportation of waste oils and oil products (adopted with DCM No131/2000, State Gazette No 59/2000). o Directive 91/157/EEC on batteries and accumulators containing certain dangerous substances

	o Commission Directive 98/101/EC of 22 December 1998 adapting to technical progress Council Directive 91/157/EEC on batteries and accumulators containing certain dangerous substances (Text with EEA relevance) o Regulation on the requirements on production and presenting to the market batteries and accumulators and on treatment and transportation of spent batteries and accumulators (adopted with DCM No 134/2000, State Gazette No 61/2000). Does the project go beyond these minimum requirements? Yes: The Dolna Arda Cascade JI Project is based on reliable international, Austrian, German, European and US rates and standards. Furthermore the Project is in compliance with all applicable EU regulations and directives relating to environment, and therefore it goes beyond the requirements of the Bulgarian law on environment.
NOISE	**NOISE EFFECTS – SUMMARY** o All sources of noise except for trucks will be concentrated on the site of HPP Studen Kladenets where the whole scope of construction works will take place and the building machinery located. With the concurrent operation of several machines there will be time spans when the total noise level in the area of the site of the HPP may reach about 95 dBA and above. Construction and erection works will be carried out only during day-time; o At times of explosion works there will be emitted momentous impulse noise the levels of which depend on the explosion technique employed. Such types of work will be limited in terms of scope; o In case of free spreading of noise, the anticipated level of noise reaching the village area Studen Kadenets will be about 65 dBA. It will occur only during day-time for a limited period of time. **MITIGATION MEASURES:** o In view of the proximity of a settlement, any work between 22.00 and 6.00 shall be prohibited; o Speed limitation of 40 km/hour for heavy-freight transport through; such traffic shall be allowed only during non-peak hours of the 24-hour period; **RELEVANT REGULATION:** o Directive 2000/14/EC of the European Parliament and of the Council of 8 May 2000 on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors o Regulation to the noise emission in the environment for machines and facilities operating outdoor (SG 74/13.09.2005) o Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise o Law on noise emission protection in the environment (SG 74/13.09.2005) Does the project go beyond these minimum requirements? Yes, 1) Voluntary self-regulation (limitation on speed; stop and time of operation) 2) Use of machinery and equipment the noise levels of which are below the EU admissible levels.

Table F.1.2 Ecological Effects during the Project Lifetime

WATER	**MITIGATION MEASURES:** Based on the water quality results, the operation modes of water reservoirs shall be adjusted (without affecting their energy and economic efficiency) with a view to their strong influence on the ecosystems. It refers to discharges of high waters through the main water outlets, monitoring of lake levels during periods of vegetation, monitoring of pollution sources in water intakes and periodical control of water quality in water reservoirs **RELEVANT REGULATION:** o Directive 2000/60/EC establishing a framework for Community action in the field of water policy, amended by Decision No 2455/2001/EC establishing the list of priority substances in the field of water policy o Water act (State Gazette No. 67/27.1999, effective 28.01.2000, last amended and supplemented, SG No. 74/2002, SG No. 91/2002, effective 1.01.2003. o Regulation No. 6 of 9 November 2000 on the Limit Values for Admissible Contents of Dangerous and Harmful Substances in the Waste Water Discharged in the Water Bodies Promulgated (State Gazette No. 97/28.11.2000) o Directive 78/695/EEC on the quality of fresh waters needing protection or improvement in order to support fish life and Directive 79/923/EEC on the quality required of shellfish waters o Regulation No. 4 of 20 October 2000 on the quality of waters supporting fish and shellfish organisms' life (State Gazette No. 88/27.10.2000) o Directive 76/464/EEC on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community, amended by Directive 91/692/EEC, amended by Directive 2000/60/EC establishing a framework for Community action in the field of water policy o Regulation No. 7 Indicators and Limit Values for Admissible Levels of Contamination of Different Categories of Surface Water o Order No. RD-272/03.05.2001 on the categorization of surface waters in water basins or parts thereof Does the project go beyond these minimum requirements? Yes. The Project is in compliance with all the applicable EU directives relating to environment. Therefore it exceeds the requirements of the Bulgarian laws and regulations on environment. **POSITIVE EFFECTS:** o Development of new water reservoir management plans incorporating requirements on fish-farming, maintenance and operation of dams in areas close to the lake sides and its inflows; o Erection of an additional turbine No.5 at HPP Studen Kladenets, Q = 30 m3/s, to limit overflows through the dam spillway and the related damages; o Erection of a small turbine, Q = 2 m3/s, at HPP Studen Kladenets for outlet of the ecological releases in order to improve the condition of the river ecosystem in the area of HPP Studen Kladenets to the tail of reservoir Ivailovgrad. This is of particular importance for the area downstream of HPP Studen Kladenets to the point where the river Krumovitsa runs into the river Arda.

AIR	**ENVIRONMENTAL EFFECT:** Additional reduction of GHG emissions due to the reduced output of TPP replaced by the increased output of Dolna Arda Cascade JI Project **MITIGATION MEASURES:** Detailed information including calculations of CO2 emission reductions is contained in the Baseline Study. Due to the fact that the hydro power capacities are the most important source of renewable energy in Bulgaria, significant emissions of CO2 and other GHG such as CH4 and N20 may be avoided. At the same time significant emissions of pollutants including SO2, NOx, PM, PAH and DD/DF will be avoided as a result of the reduced output of TPP. This further reduction in emissions obtained as a result of the implementation of the JI project is estimated, for the period 2008-2012, as follows: o SO2 – about 2856 tons; o NOx – about 997 tons; o PM – about 98 tons; o CH4 – about 950 kg; o N2O – about 1,75 tons; o PAH – about 46,5 gr; o PCDD/PCDF – about 33,3 mg; Improved moisture content of air and slight increase in the total air humidity over reservoirs and in the close vicinity thereof during the dry season will have a favourable effect on people using the area for recreation and tourism. **RELEVANT REGULATION:** o Framework Directive 96/62/EC on Ambient Air Quality Assessment and Management o Clean Air Act (SG No 45/2000) with amendments (SG No27/2000) o Regulation No.7 from may 3, 1999 on ambient air quality assessment and management o Directive 99/30/EC relating to limit values for sulphur dioxide, nitrogen dioxide and fine particulate matter and lead in ambient air o Regulation No9 of 3 May 1999 on limit values for sulphur dioxide, nitrogen dioxide, fine particulate matter and lead in ambient air o Regulation No.10 of 6 October 2003 on admissible emission rates (concentrations) Does the project go beyond these minimum requirements? Yes: The Project is in compliance with all the applicable EC directives relating to environment. Therefore it exceeds the requirements of the Bulgarian laws and regulations on environment **POSITIVE EFFECTS:** o Additional reduction in GHG emission and emission of other noxious flue gases

LAND USE	**INTRODUCTION:** Soils in the water catchments in the East Rhodopi are mainly maroon washed forest soils gradually turning into light brown forest soils in the higher areas. Some humus-carbonaceous (Rendzini) soils occur above the limestone rocks. All types of soil in the region are more or less eroded (2nd to 5th degree). Their mechanical composition is most frequently clayey-sandy, medium to highly stony. The catchment areas of the dams include some farm lands as well (most frequently tobacco fields) where the soil is of the antropogeneous type and agrogeneous kind. The geology of the site where new construction in HPP Studen Kladenets will take place is analysed in the Environmental Audit. **EROSION:** The East Rhodopi have been subjected to the impact of human activities for ages. As a result of illegitimate felling and uprooting, extensive agriculture and grazing, a large part of the dam catchment areas were transformed into severely eroded lands – barrens and devastated forest. The large-scale construction of water reservoirs in a region subjected to strong erosion requires large-scale measures for restriction and stopping of erosion processes in their water catchment areas. In parallel with construction of the dams, Erosion Control Engineering Projects were implemented including complex measures – afforestation and construction of engineering facilities. In the first place, afforestations encompass severely eroded barren areas and devastated forests. Improvement of the condition of the natural deciduous forest is done by means of "rejuvenation" – cutting and prohibition of grazing. Linear erosion is controlled by means of construction of weirs on all streams falling into the dam lakes wherever required. Pictures of the HPP and the Cascade reservoirs are depicted in Annex 12: Pictures of the HPP and the Cascade Reservoirs. As a result of large-scale afforestation and erosion-protection facilities, erosion in the water catchments of dams has been seriously reduced, the landscape has changed, and all that has a beneficial effect on the climate factors. The forest plants developed in the region are in the range of several tens of thousands of acres. **ENVIRONMENTAL EFFECT:** The soil on the construction site of the extension of HPS Studen Kladenets (the exit of the tunnel) is technogeneous. It is an old embankment without any humus layer. The area occupied by it is about 400 m2. In geological terms the region of the new construction site for HPP Studen Kladenets (around the dam wall, the water tower, penstock and power house) is underlied by pyroxenic andesite – porous, prismatically cracked, interspersed with numerous calcite and quarz veins. The depth of andesite along the river bed of the Arda does not exceed 150 m **MITIGATION MEASURES:** Not necessary

	RELEVANT REGULATION: o Environment Protection Act (SG No 91/25.09.2002), latest amendment (SG 77/27.09.2005) o Subsurface Resources Act (SG No 23/12.03.1999) o Regulation on the National Geofund (SG 6/21.01.2000) Does the project go beyond these minimum requirements? No
BIODI-VERSITY	To the south of the right-hand bank of Studen Kladenets dam is the Valtchi Dol Reserve declared by Order No. 877/1980 for preservation of Griffon vultures, habitats of rare and endangered bird species, locations of endemic plants, and ecosystems typical of the East Rhodopi. To the west of Studen Kladenets dam is an ornitologically significant area, Studen Kladenets, and in the direction of r. Krumovitsa is the ornitologically significant area Krumovitsa. Above the village of Studen Kladenets there is a cooling cave. The gorge Shaytan Cupru is between the dam and the station. **MITIGATION MEASURES:** The erection of the small turboset No. 6 for outlet of the ecological releases in HPS Studen Kladenets and securing of the minimum permissible flow in the Arda downstream of HPS Studen Kladenets will have a definitely beneficial effect on the river zoocenoses of macrozoobentos. Does the project go beyond these minimum requirements? Yes: The Project is in compliance with all applicable EU regulations and directives relating to biodiversity, therefore it goes beyond the requirements of the Bulgarian environmental law. **CONCLUSION ON BIODIVERSITY:** 1.) The hydro-engineering facilities of Dolna Arda Cascade are located in the East Rhodopi mountains. The National Strategy on the Protection of Biological Diversity in this part of the country including the valley of the Arda from its springs to the border, according to available data on the flora and fauna, is indicated as a region of medium and high significance considering the summarized data on the rich variety of species, endemic and rare taxa. (Please see Annex 13: Map 7 Gap Analysis). 2.) There are no sensitive species of the flora included in the Red Book of Bulgaria within the range of the water reservoirs and HPP of the Dolna Arda Cascade. Further information is available in Annex 10: Dolna Arda Environmental Audit. 3.) Among the proven species found near the proposed construction site, only European blind snake inhabiting places with specific soil conditions is included in the Red Book of Bulgaria. It cannot be found on the rocky slope under which the pipeline will be laid. Further information on the fauna classification can be found in the Environmental Audit.

WASTE

ENVIRONMENTAL EFFECT:

Waste generated during operation shall be managed by the Waste Management Plan for each power plant to be developed for the commercial operation stage after completion of the JI Project. Their quantities will be determined in the Waste Management Plan. The HPPs within the Cascade shall arrange for the source separation of all types of waste and their subsequent recycling, whenever appropriate.

Waste generated by type, their estimated quantity and 6-digit code specified in the List of Waste under Appendix 1 of Regulation 3/01.04.2004 of the MEW and MH (SG 44/25.05.2004) on the classification of waste are as follows:

№	Type of Waste	Code	Dangerous or other	Quantity per year
1.	Waste mercury-vapour and fluorescent lamps	20.01.21	dangerous	200kg
2.	Canteen biodegradable waste	20.01.08	domestic	1t/a
3.	Source separated waste packing	15.01	domestic	1050kg
3.1	Plastic wrapping	15.01.02	domestic	150kg
3.2	Glass wrapping	15.01.07	domestic	600kg
3.3	Paper and cardboard wrapping	15.01.01	domestic	300kg
4.	Motor non-chloridized petroleum oil for gear drive applications	13.02.05	dangerous	1000kg
5.	Non-chloridized insulation and heat conductive petroleum oils	13.03.07	dangerous	2500kg
6.	Synthetic motor and lubricating oils for gear drives	13.02.06	dangerous	1900kg
7.	Lead-acid storage batteries	16.06.01	dangerous	400kg
8.	Ferrous metal	16.01.17	industrial	500kg
9.	Non-ferrous metal	16.01.18	industrial	300kg

MITIGATION MEASURES:

Source separation of waste and recycling of oils, metals, glass, plastic, paper and cardboard.

RELEVANT REGULATION:

- Directive 75/442/EEC on waste
- Law on Waste Management (State Gazette No 86/2003);
- Regulation No.3 on Classification of Waste (SG 44/25.05.2004);
- Regulation No.9 of 28 September on the procedure and forms of submitting information on the waste related activities and the procedure of keeping the public register of permits, application documents and terminated projects and activities;
- Regulation No. 7 on the selection criteria applicable to the sites of waste treatment facilities (SG 81/17.09.2004);
- Regulation No.8 on the conditions and procedure of building and operating depots and other facilities for utilization and making harmless of waste (SG 83/24.09.2004)
- Directive 91/689/EEC on the hazardous waste
- Regulation on the requirements for treatment and transportation of industrial and hazardous waste (adopted with Decree of the Council of Ministers No 53/1999; State Gazette No 29 /1999);

Does the project go beyond these minimum requirements?

Yes: The Project is in compliance with all applicable EU regulations and directives relating to biodiversity, therefore it goes beyond the requirements of the Bulgarian environmental law.

F.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to supporting documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

From an environmental point of view, the project will only have minor impacts. Pursuant to Article 93, para 1 of the Environmental Protection Act (SG, 91/ 25.09.2002), last amendment (SG 77/27.09.2005) by letter No 04-21-445 dated 29.03.2005, NEK informed the MEW of its intention to undertake the proposed Project and requested their decision on the need for an environmental impact assessment.

After examining the documents so submitted the MOEW in its letter No26-00-881/ 26.04.2005 notified NEK as follows:

- Refurbishment of an HPP within the Cascade is not a subject of the procedures set out under Chapter VI of the EPA;
- The installation of new capacities at HPP Studen Kladenets is considered as an extension of a site that comes under the provisions of the EPA Appendix No.2;
- On the grounds of Article 93, para 1, item 2 of the EPA the investment proposal is a subject of judgment on the need for EIA and the competent person to issue such a decision is the director of the Regional Inspectorate on Environment in Haskovo.

Based on a copy of the above letter the Regional Inspectorate in Haskovo notified NEK by letter No.858/29.04.2005 to file a written request for judgment on the need for EIA together with the information under Appendix No.2 to the regulation on EIA (SG 25/2003).

In its letter No32-00-1/08.09.2005 to the Regional Inspectorate in Haskovo NEK furnished the required documentation for the judgment on the need for EIA of the project. The documentation contained the required information for the judgment prepared by NEK in the form of an Environmental Audit of the Cascade. The Environmental Audit is attached as Annex 10.

Based on the information submitted by NEK the Regional Inspectorate in Haskovo published a Decision No НА – 57 – ПР/ 2005 which determines not to undertake an EIA of the project. The Decision is attached as Annex 9.

SECTION G. Stakeholders' comments

G.1. Information on stakeholders' comments on the project, as appropriate:

Table G.1.1 Identity of stakeholders

Stakeholder 1	
Name	**Town Council of Krumovgrad**
Description of the effects of the project on the stakeholder	1. The Cascade facilitates management of high waters and due to the significant retention capacity of water reservoirs plays a significant role in mitigating flood damages. 2. To a certain extent the Cascade has a social effect for the population of Kardjali, Ivailovgrad and the village of Studen Kladenets as it provides employment during the operation of the hydro facilities and their maintenance. In implementing the Rehabilitation Project

	additional jobs will be opened for construction and erection workers. 3. Increased economic effect of the cascade resulting from the utilization of part of the overflowing waters of Studen Kladenets by installing an additional unit of 16 MW at HPP Studen Kladenets; 4. Securing the minimum permissible outflow downstream of HPPStuden Kladenets with the erection of a turbine, P = 1 MW and Q = 2 m3/s, to preserve the river ecosystem in the area between reservoir Studen Kladenets and reservoir Ivailovgrad, and for irrigation purposes. 5. The reservoir Ivailovgrad provides 186 mln. m3 of summer water for irrigation in Greece and Turkey.
Address	Krumovgrad 5, Bulgaria Square PO Box 6900
Phone/fax	Phone: +359 03641 2312; Fax: +359 03641 40 24 122 GSM +359 887 599 315
E-mail	abidin@abv.bg
Contact person	**Abidin Hadjimehmed, M.Sc., Deputy Mayor**
Stakeholder 2	
Name	**Town Council of Kardjali**
Description of the effects of the project on the stakeholder	o Continued operation of water reservoir Kardjali and HPP Kardjali is of particular importance for the municipality. A proper management of the hydro-engineering facilities would keep out of the possibility not to utilize spring-time high waters. o The water reservoir secures flooding of the river section of reservoir Kardjali to reservoir Studen Kladenets creating conditions for irrigation during summer months when usually the river volume is not sufficient for irrigation. o Subject to the industrial needs of Kardjali, the reservoir Kardjali provides 10 to 20 mln. m^3 water per year. o Commercial fish-farming has been developed in the dam lake. The reservoir is used for fishing as well. There is a facility there for rowing competitions. Recreational facilities are built round the dam lake.
Address	41, Bulgaria Square Municipality of Kardjali PO Box 6600
Phone/fax	Phone: +359 0361 656 30; GSM +359 887 258 995
E-mail	Ekologia_kj@abv.bg
Contact person	**Assia Dobrudjalieva, Head of Unit Environmental Protection to the Municipality**

Table F.1.2 Stakeholders' comments

Brief description of how comments by (local) stakeholders have been invited and compiled **Please describe the process by which comments by (local) stakeholders have been invited and complied.**	By Letter No. 04-21-44 dated 29.03.20005, NEK submitted to the Ministry of Environment and Water (MEW) the required documents to express interest to the Austrian Programme JI/CDM requesting their review and issuance of a No Objection Letter to undertake the Project as a JI project. Pursuant to Article 93, para 1 of the Environmental Protection Act (SG, 91/ 25.09.2002), last amendment (SG 77/27.09.2005) by letter No 04-21-445 dated 29.03.2005, NEK informed the MEW of its intention to undertake the Project and requested their decision on the need for an environmental impact assessment. After examining the documents so submitted the MOEW in its letter No26-00-881/ 26.04.2005 notified NEK as follows: o Refurbishment of an HPP within the Cascade is not a subject of the procedures set out under Chapter VI of the EPA; o The installation of new capacities at HPP Studen Kladenets is considered as an extension of a site that comes under the provisions of the EPA Appendix №2; o On the grounds of Article 93, para 1, item 2 of the EPA the investment proposal is a subject of judgment on the need for EIA and the competent person to issue such a decision is the director of the Regional Inspectorate on Environment in Haskovo. Based on a copy of the above letter the Regional Inspectorate in Haskovo notified NEK by letter No.858/29.04.2005 to file a written request for judgment on the need for EIA together with the information under Appendix No2 to the regulation on EIA (SG 25/2003). Furthermore NEK was required to inform in writing and through the mass media the concerned population in the village of Studen Kladenets and the municipality of Krunmovgrad. In its letter of 16.05.2005 NEK duly advised the municipality of Kardjali, the municipality of Krumovgrad and the village of Studen Kladenets where the Cascade hydro-engineering facilities are located, of its intention to implement the Project for refurbishment of the Cascade. The PIN and completed OeKB questionnaire were enclosed to the letters. In its issue 94/19 May 2005 newspaper "New Life" (local newspaper having the largest circulation in the Rhodopi region) published an official statement by NEK of the intention to commence the Project. In its letter No32-00-1/08.09.2005 to the Regional Inspectorate in Haskovo NEK furnished the required documentation for the judgment on the need for EIA of the project. The documentation contained the required information for the judgment prepared by NEK in the form of an

	Environmental Audit of the Cascade. The Environmental Audit is attached as Annex 10. Based on the information submitted by NEK the Regional Inspectorate in Haskovo published a Decision NoXA – 57 – ПР/ 2005 which determines not to undertake an EIA of the project. The Decision is attached as Annex 9. The opinion of the municipality of Krumovgrad on the project is stated in its letter No59-02-22/15.09.2005. The opinion is attached as Annex 14.
Summary of the comments received **Please identify stakeholders that have made comments and provide a summary of these comments.**	**I. Comments by the Regional Inspectorate in Haskovo** 1. The comments confirmed the mitigation measures described in the Environmental Audit of the Cascade and are favorable to the project. 2. It is concluded that the project will not affect any protected areas and habitats, mountain and wooded lands, humid zones, existing historical monuments and territories of special sanitary status. 3. No complaints (written or verbal) against the project have been made. **II. Comments by the Municipality of Krumovgrad** 1. The Opinion is favorable. 2. The engineering solution of increasing the capacity of HPP Studen Kladenets has been given a positive appraisal since it will also have a positive ecological effect from the restoration of the river ecosystem along the Arda valley towards the reservoir Ivailovgrad. 3. High waters from heavy rains may flood the villages situated along the river valley between dams Studen Kladenets and Ivailovgrad because there are no protection embankments/dikes. It is proposed to install an early warning system to signal elevation of water levels of Arda above the normal level during spring and autumn-winter seasons.
Report on how due account was taken of any comments received **Please explain how due account has been taken of comments received.**	1. The mitigation measures stipulated in the Environmental Audit are incorporated in the engineering design for the refurbishment of the Cascade. 2. The proposal of the municipality of Krumovgrad will be included in the Dolna Arda Cascade Water Management Programme.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

Organisation:	Natsionalna Elektricheska Kompania EAD (NEK)
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Building:	-
City:	Sofia
State/Region:	-
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Country:	Bulgaria
Phone:	+359 2 54909
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E-mail:	nek@nek.bg
URL:	http://www.nek.bg
Represented by:	VELKOV Lubomir
Title:	Executive Director
Salutation:	Mr.
Last name:	VELKOV
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Mobile:	-
Personal e-mail:	lvelkov@nek.bg

Annex 2

BASELINE INFORMATION

The Baseline calculations were performed in the form of spreadsheets. The following table contains the key elements of the Baseline. Additional supporting documentation/information for the Baseline calculations can be found in Annex 3 "Baseline Study".

ID number	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
BL-1.	EGy Gross Electricity Output	National Dispatch Center (NDC) and Thermal Power Plants (TPP's)	GWh	(m)	Hourly measurement and monthly recording	100%	Electronic and paper during the crediting period and two years after	Gross electricity power generation of power units/plant. Double check by receipt of sales.
BL-2.	GHRy Gross Heat Rate	TPP's	kJ/kWh	(c)	monthly	100%	Electronic and paper during the crediting period and two years after	Calculated using the results of fuel chemical composition analysis. Obtained by TPP's
BL-3.	EIy Energy Input	NEK - EAD	GW	(c)	monthly	100%	Electronic and paper during the crediting period and two years after	Calculated with formulae: EIy = EGy * GHRy
BL-4.	NCVy Net Calorific Value	TPP's and authorises labs	GJ/Mg MJ/Nm^3	(m)	monthly	100%	Electronic and paper during the crediting period and two years after	Obtained by chemical analysis of the fuel on as-received base in the specific power plant
BL-5.	CCy Carbon Content	TPP's and authorises labs	%	(m)	monthly	100%	Electronic and paper during the crediting period and two years after	Obtained by chemical analysis of the fuel on as-received base in the specific power plant

ID number	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
BL-6.	CEFy Carbon Emission Factor	NEK - EAD	kgC/GJ	(c)	monthly	100%	Electronic and paper during the crediting period and two years after	Calculated with formulae: CCy * 10 / NCVy
BL-7.	$Unox_y$ Fraction of carbon Unoxidized in fuel residues – fly ash and slag	TPP's	%	(m) and (c)	monthly	100%	Electronic and paper during the crediting period and two years after	Obtained by chemical analysis of the fuel residues – fly ash and slag - in the specific power plant.
BL-8.	CEm_y Actual Carbon Emissions	Calculated from EI_y and CEF_y	kt/a	(c)	monthly	100%	Electronic and paper during the crediting period and two years after	Calculated with formulae: $CEm_y = EI_y * CEF_y * (100-Unox_y) / 10^8$
BL-9.	$CO2Em_y$ Actual CO2 Emissions	Calculated from CEm_y	kt/a	(c)	monthly	100%	Electronic and paper during the crediting period and two years after	Calculated with formulae: $CO2Em_y = CEm_y * 44 / 12$
BL-10.	EFy CO2 Emission per one MWh power generation	Calculated from $CO2Em_y$ and EGy	t/MWh	(m) and (c)	monthly	100%	Electronic and paper during the crediting period and two years after	Calculated with formulae: $EFy = CO2Em_y / EGy$

ID number	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
BL-11.	APy Auxiliary Power needs	TPP's	%	(m)	monthly	100%	Electronic and paper during the crediting period and two years after	Auxiliary Power needs per electricity generation of power units. Difference between Gross and Net power generation.
BL-12.	$CO2_{SN}Em_y$ Net CO2 Emission per kWh power generation	Calculated from EFy and APy	t/MWh	(c)	monthly	100%	Electronic and paper during the crediting period and two years after	Calculated with formulae: $CO2_{SN}Em_y = EFy*100 / (100 – APy)$

Annex 3

BASELINE STUDY

File: <Annex 3 PDD Baseline Study Dolna Arda.pdf>

Annex 4

MONITORING PLAN

File: <Annex 4 PDD Monitoring Plan Dolna Arda.pdf>

Annex 5
BULGARIA MAP DOLNA ARDA CASCADE
File: <Annexes 5-14 PDD Dolna Arda.pdf>

Annex 6
SCHEME DOLNA ARDA CASCADE
File: <Annexes 5-14 PDD Dolna Arda.pdf>

Annex 7
LONGITUDINAL SECTION DOLNA ARDA CASCADE
File: <Annexes 5-14 PDD Dolna Arda.pdf>

Annex 8
LETTER OF APPROVAL
File: <Annexes 5-14 PDD Dolna Arda.pdf>

Annex 9
DECISION MOEW REGIONAL INSPECTORATE HASKOVO
File: <Annexes 5-14 PDD Dolna Arda.pdf>

Annex 10
DOLNA ARDA ENVIRONMENTAL AUDIT
File: <Annexes 5-14 PDD Dolna Arda.pdf>

Annex 11
TIME SCHEDULE DOLNA ARDA
File: <Annexes 5-14 PDD Dolna Arda.pdf>

Annex 12
PICTURES OF THE HPP AND THE CASCADE RESERVOIRS
File: <Annexes 5-14 PDD Dolna Arda.pdf>

Annex 13
MAP 7 GAP ANALYSIS
File: <Annexes 5-14 PDD Dolna Arda.pdf>

Annex 14
OPINION KRUMOVGRAD MUNICIPALITY
File: <Annexes 5-14 PDD Dolna Arda.pdf>