Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management

A guide to carrying out

Joint Implementation and Clean Development Mechanism Projects

within the framework of the Austrian JI/CDM Programme

Part 3: Preparation of the Project Design Document (PDD)

(Proposal: Appendix 6)

(Version 1.3)

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Editorial

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I. Introduction

The PDD serves as the central document within the Joint Implementation (JI) and Clean Development Mechanism (CDM) approval procedure. It should deliver detailed information on the project and serves the Programme Management of the Austrian JI/CDM Programme as the basis for project appraisal and approval.

The PDD must be in English and comprise the following:

- project description,
- ecological, socio-economic and development effects of the project,
- (if available) stakeholder comments,
- baseline,
- monitoring plan.

The PDD has to be submitted to the Programme Management of the Austrian JI/CDM Programme.

Programme Management:

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Türkenstraße 9, A-1092 Vienna, Austria
Tel.: ++43 1 316 31–0, Fax: ++43 1 316 31–104
E-mail: kyoto@kommunalkredit.at

Transparency of the PDD

The Marrakesh Accords specify that parts of the PDD must be made publicly available. Therefore, prior to PDD submission the applicant shall clarify which sections of the PDD are deemed as confidential and thus may not be made publicly available.

Comments regarding the PDD may be put forward for both JI and CDM projects for 30 days. These comments must then also be made publicly available.

Support for filling in forms

Differentiation between “Avoidance” and “Reduction”

Two project types can be differentiated:

1) Avoidance: These projects essentially only generate 'relative' emission reductions. This means that Avoidance projects always encompass the construction of a new plant and therefore lead to emissions, simultaneously however prevent other, inefficient projects being realised or staying in operation which would otherwise lead to even higher emissions.

2) Reduction: These projects result in 'absolute' emission reductions in existing enterprises, for example, through efficiency increases or refurbishment measures, e.g. reducing the use of primary fossil fuels.

This differentiation is especially significant regarding environmental and socio-economic project impacts.

Relevance

Since not all questions are relevant to all submitted projects, it is sufficient to answer only those questions which are relevant to your project. However, the Management of the Austrian JI/CDM Programme will always carry out a relevance plausibility check and may request relevant details if required.

PDD of the Executive Board

The PDD at hand is partially more comprehensive than the standard PDD of the Executive Board (EB PDD), which additionally has to be filled in in the case of CDM projects. The Austrian PDD includes all details which are queried in the EB PDD (Version 01). In order to facilitate filling in the EB PDD the Austrian PDD comprises cross references to the correspondent articles of the EB PDD (Version 01). Recapitulatory the appendix shows a comparison of the EB PDD (Version 01) and the PDD of the Austrian JI/CDM Programme. The EB PDD template (Version 01) is available at http://cdm.unfccc.int/Reference/Documents.[1]

[1] In the case of CDM projects modifications of the EB PDD shall be accounted for accordingly. Cp. http://cdm.unfccc.int/.

II. Template for the Project Design Document (PDD)

A General Project Description

A 1 PROJECT IDENTIFICATION

Title of the project activity *(EB PDD A.1.)* **Vacha Cascade Joint Implementation Project**

Applicant **Natsionalna Elektricheska Kompania EAD Sofia**

Date of Submission **15. January 2004**

A 2 GENERAL INFORMATION

A 2.1 General information	
Project name	Vacha Cascade Joint Implementation Project
Project type	☒ Avoidance ○ Reduction
Description of the project activity and its purpose *(EB PDD A.2.)*	The main objective of the Vacha Cascade JI Project is the generation of electricity based on renewable energy sources. The Vacha Cascade Joint Implementation Project consists of two main parts – first, the construction of the Tsankov Kamak hydro power station and second, the rehabilitation of the existing hydro power stations Teshel, Devin, Orpheus and Krichim. The Vacha Cascade JI Project is situated in the Rhodope Mountains along the Vacha River in the Southern part of Bulgaria. **1. Tsankov Kamak HPP:** The Tsankov Kamak hydro power project includes the construction of the Tsankov Kamak Reservoir with a net volume of 80 mln. m^3. This additional regulating volume in the scheme of the Vacha Cascade will allow an optimization of the water flows from the reservoir to the existing HPPs in the Cascade which will result in additional electricity generation by these power plants. Therefore, this additional electricity generation is generated by the construction of the Tsankov Kamak Hydro Power Project. Tsankov Kamak Dam Reservoir: The Tsankov Kamak Dam Reservoir is situated in the Vacha River Valley near the village of Mihalkovo. The dam site is at a distance of about 400 m downstream from the confluence of the Vacha River and the Gashina creek. The reservoir stretches upstream to the town of Devin. The maximum water level will only slightly have an influence on existing infrastructure and has been concerted with the relevant local authorities. The dam is situated under favorable topographic and geological conditions: At the end of a narrow valley stretch and mainly in sound granites and gneisses. At the left side of the valley there is a fracture zone (Mylonites) with a width of approximately 7 meters, which will be filled with concrete. However there are no major problems expected in this respect. The dam structure will comprise a bottom gallery, which will serve as a drainage gallery as well and which will be used for the grouting works. The gated spillway is situated at the dam crest and is designed for 1500 m^3/s discharge, this is 10,000 years return interval. The stilling basin at the dam toe is also used for the bottom outlet, equipped with two steel pipelines. Via the bottom outlet it is possible to release the water stored within 25 days. Furthermore a pipeline for residual flow for ecological purposes is foreseen, which can supply 0.73 m^3 /s discharge into the river. The possibility for a mini hydropower plant with a power capacity of approximately 1 MW using this discharge is considered. Tsankov Kamak Power Station: According to the installed power capacity (2x40 MW) this power plant will be

	operated mainly as a peaking plant and also in the framework of system control. It has to be considered that without the power plant Tsankov Kamak primary control has to be managed with classical thermal power plants. The average net head is 133.7 m, therefore the rated power capacity is 80 MW, generating 198 GWh/a. The annual utilization hours are 2,475 h. The power conduit comprises an intake structure, situated in the Grashina valley of low-pressure riverside type and a underground penstock with 4.5 m diameter, steel-lined and self-supported. After a vertical shaft with a height of 51 m a slightly inclined section follows, 526 m long and a collector (manifold) section. The power station is situated near the slope in order to provide sufficient space for an outdoor switchyard. The tailrace channel is about 700 m long, the necessary Vacha River regulation is approximately 1300 m long. Two main step-up transformers will be installed in bays outside the building in the switchyard with 50 MVA rated capacity each. Voltage ratio is 10.5/242 kV. The power plant can be operated in automatically local controlled mode, and also remotely from the South regional dispatching control center. All necessary equipment is foreseen. **2. Teshel, Devin, Orpheus, Krichim Rehabilitation Project:** The rehabilitation project concerns the following power station: - Teshel HPP - Devin HPP - Orpheus PSHPP - Krichim HPP The rehabilitation project will lead to improved efficiency coefficients and therefore the electricity generation of the four hydro power plants will increase. The aim of the project is the generation of some 214 GWh/a, based on renewable energy sources. As a result of the rehabilitation project and the increased efficiency coefficients of the existing hydro power station (HPP Teshel, HPP Devin, PSHPP Orpheus, HPP Krichim) the annual power generation will be increased by about 16 GWh/a. An average of 198 GWh/a will be generated after commissioning the Tsankov Kamak power station. The electricity generated by the Vacha Cascade project will replace electricity generated by other power plants in the Bulgarian electric power system.
Description of the background to the project	The Vacha Cascade Project is situated in the Rhodope Mountains along the Vacha River in the southern part of Bulgaria. The construction of the Dospat-Vacha Cascade project started in 1958 and until 1984 the following facilities were constructed and commissioned: Gorna Vacha, including Dospat Reservoir, Teshel HPP, Teshel Reservoir and Devin HPP Dolna Vacha, including Vacha Reservoir, Orpheus HPP, Krichim Reservoir with Krichim HPP and Vacha-I + II HPP. The Tsankov Kamak Project is located between the Devin HPP and the Vacha Reservoir and consists of a reservoir created by an arch dam, a short power conduit and a power house with tailrace channel. Due to the considerable large usable storage volume there will be the possibility especially for dry periods to amend natural flow in the lowest reach of Vacha River for the benefit of agriculture and public water demand. More than 20 years ago NEK EAD started looking for a financial set up for the

	Tsankov Kamak Project. Many attempts have been made so far to set up a financing scheme for the project, but no attempt was successful so far. The financing process was blocked until it became clear the Joint Implementation under the Kyoto Protocol could play a substantial role. The Vacha Cascade Joint Implementation Project will contribute to Bulgarias efforts towards decreasing the energy dependency and achieving sustainable development by using domestic renewable energy resources.

A 2.2 Category(ies) of project activity	
Project category *(EB PDD A.4.2.)*	○ Construction (retrofitting) of combined heat and power coupling plants ○ Energy sources transfer in energy conversion installations and production plants to renewable energy sources or from energy sources with high carbon content to energy sources with lower carbon content, especially in existing district heating systems ☒ Construction (or retrofitting) of generating plants operated with renewable energy sources (especially wind power stations, biogas or biomass combined heat and power coupling as well as hydroelectric power plants) ○ Projects whose purpose is the avoidance or (energy) recovery of landfill gas ○ Waste management measures which contribute to avoidance of greenhouse gas emissions especially through energy recovery of waste, if possible under consideration of waste heat utilisation ○ Projects serving the reduction of end-user energy consumption in residential accommodation, public and private service office buildings as well as in industrial applications and processes (including waste heat potentials) (energy efficiency projects) ○ Other: _____

A 2.3 Greenhouse gases	
Greenhouse gases reduced through the project	☒ CO_2 ○ CH_4 ○ N_2O ○ HFCs ○ PFCs ○ SF_6

For small-scale projects simplifications in certain areas are possible (baseline, monitoring plan etc.). Information is available at http://cdm.unfccc.int/.

A 2.4 CDM project category	
CDM project category	○ Normal project ○ Small-scale project o Renewable energy project activity with a maximum output capacity equivalent of up to 15 megawatts (or an appropriate equivalent) o Energy efficiency improvement project activity which reduces energy consumption, on the supply and/or demand side, by up to the equivalent of 15 gigawatthours per year o Other project activity that both reduces anthropogenic emissions by sources and directly emits less than 15 kilotonnes of carbon dioxide equivalent annually

A 3 PROJECT PARTICIPANTS *(EB PDD A.3.)*

A 3.1 Applicant	
Name	Natsionalna Elektricheska Kompania EAD (NEK) Sofia
Type of organization	○ Authorities: _____ ○ Private enterprise ○ NGO ☒ Other: _____Joint-stock Company (100 % state owned)_____
Other functions of applicant within the project	☒ Sponsor ○ Intermediary ☒ Technical consultant ○ Other: _____
Main activities, knowledge and experience	Natsionalna Elektricheska Kompania EAD (NEK EAD) is a sole-owner joint-stock company, 100% held by the State and having its seat of business in Sofia. The managing bodies of the joint-stock company are the General Assembly, a five-member Board of Directors and a Procurator. The sole-owner rights are exercised by the Minister of Energy and Energy Resources. One of the main functions of NEK as a commercial company is to purchase, transport and sell to high-voltage customers and power distribution companies the electricity generated not only by the company itself, but also by power generation companies (NPP and TPP) within the system of the Ministry of Energy and Energy Resources, private HPP, district-heating plants and industrial autoproducers. Part of the wheeled electricity, if there is a market, is sold abroad – Turkey, Greece, Serbia, etc. In the beginning of 2002, NEK EAD was the owner of 64 hydro power plants with 2,729 MW total installed capacity. In the same year, thirteen small power plants with a total capacity of 114 MW were privatized. Therefore, at the end of 2002, NEK EAD was running 51 hydro power plants of total 2,615 MW. The electricity produced by the Company comes from totally 51 hydropower and pumped-storage plants that for the time being are operated and maintained by NEK EAD. The 14 largest of these plants operate within four cascades: Belmeken-Sestrimo-Chaira, Batak, Vacha and Arda, all used to generate electricity, cover peak loads and regulate the parameters of the electric power system. Transmission of electricity is carried out through the high-voltage power transmission network all over the territory of Bulgaria. It is owned by NEK EAD which is responsible for the technical policy, operation, maintenance and development of the power transmission facilities encompassed by the national energy ring. It consists of overhead power lines (750 kV - 85 km long; 400 kV of 2207 km total length; 220 kV of 2650 km total length; 110 kV of 9167 km total length), substations (237 step-down substations) and a switching substation.

	Another task of national importance that the company performs through the National Dispatch Center is to act as the operator of the power transmission system of the Republic of Bulgaria. In this respect the National Dispatch Center (NDC), in its capacity as a specialized unit of Natsionalna Elektricheska Kompania, performs the functions of real time dispatching of the electric power system (EPS) of the Republic of Bulgaria and ensuring the reliable power supply to customers of the Company. At the same time, the staff of the Company has been working strenuously for years to achieve such technical performance of Bulgarian EPS that would enable it to join the Interconnected European Power System (UCTE). To this effect the main assignment that NDC performs successfully is to guarantee reliable and economic operation of the Bulgarian EPS under the conditions of a liberalizing market. As a result, the final stage of the interconnection procedure has been stared this year and one can expect definitely to have the interconnection effected over the next year. On 1 July 2002, another serious step towards our European integration was made – NEK EAD was admitted as a full member into SUDEL (the Regional Union of the Interconnected Electric Utilities in Southeast Europe). Thus the Company took its place together with the other members, i.e. the electric utilities of Austria, Bosnia and Herzegovina, Greece, Macedonia, Slovenia, Hungary, Croatia, Yugoslavia (Serbia and Montenegro). NEK EAD is entrusted with the duty to operate and maintain the large dams and hydropower facilities in Bulgaria, and to produce dam's daily water balance reports for the needs of the Ministry of Environment and Waters. The company manages 43 main dams and saddle dams (including the highest dams in the country) and compensating basins, 671 km of tunnels and channels, more than 500 water intakes and other hydro engineering facilities. The total built-up capacity of the dams managed by NEK EAD is 50.1% of the total controlled capacity of all water reservoirs in the country. Irrespective that the main business of NEK EAD is transmission of electricity, the Company participates actively in developing the programs of the Ministry of Environment and Waters intended to satisfy the requirements of the EU Directives concerning the environmental protection measures for the energy sector. The Company takes measures to maintain and preserve the nuclear power plant Belene. The future development of this industry accompanied by stepwise liberalization of the electricity market and integration into the European structures calls for priority construction of new interconnection lines, upgrading of the electric power control function and construction of new generation capacities. Further Information: www.nek.bg
Address	Natsionalna Elektricheska Kompania EAD (NEK) 5 Veslets Street; 1040 Sofia, Bulgaria
URL	http://www.nek.bg/
Phone/fax	phone: + 35 92 9881912 fax: +35 92 9865901

E-mail	nek@nek.bg
Contact person *Name, department, phone, fax, e-mail*	Dipl. Ing. Vasil Anastasov - Executive Director phone: + 35 92 9881912 fax: +35 92 9865901 nek@nek.bg

A 3.2 Project developer	
Name	Natsionalna Elektricheska Kompania EAD (NEK) Sofia See above.
Type of organization	○ Authorities: _____ ○ Private enterprise ○ NGO ○ Other: _____
Other functions of project developer within the project	○ Sponsor ○ Intermediary ○ Technical consultant ○ Other: _____
Main activities, knowledge and experience	
Address	
URL	
Phone/fax	
E-mail	
Contact person *Name, department, phone, fax, e-mail*	

A 3.3 Other project participants	
Name	**1. VA Tech Hydro**
Type of organization	○ Authorities: _____ ☒ Private enterprise ○ NGO ○ Other: _____
Other functions of project participant within the project	○ Sponsor ○ Intermediary ☒ Technical consultant ☒ Other: The Austrian Supplier Group _____
Main activities, knowledge and experience	VA TECH HYDRO is a company within the listed VA Technologie AG (VA TECH) Group and is a global supplier of electromechanical equipment and services for hydropower plants. VA TECH HYDRO is one of the world`s largest suppliers for the hydropower generation market, and holds a leading position in the growing power plant refurbishment sector. • More than 160 years of turbine experience • Over 25,000 turbines (225,000 MW) installed • Over 100 years experience in electrical power plants • Complete range up to 500 MW Leading in Service & Rehabilitation Further Details: http://www.vatech-hydro.com/
Address	VA TECH Hydro GmbH & Co Penzinger Strasse 76 A-1141 Wien
URL	http://www.vatech-hydro.com/
Phone/fax	Phone: +43 1 89100-0 Fax: +43 1 89100-3757
E-mail	contact@vatech-hydro.com

Contact person *Name, department, phone, fax, e-mail*	Mr. Herbert Holzinger Herbert.holzinger@vatech-hydro.at Phone: +43 1 89100-2671 Fax: +43 1 89100-3757
Name	**2. Alpine Mayreder**
Type of organization	○ Authorities: _____ ☒ Private enterprise ○ NGO ○ Other: _____
Other functions of project participant within the project	○ Sponsor ○ Intermediary ☒ Technical consultant ☒ Other: The Austrian Supplier Group_____
Main activities, knowledge and experience	http://www.alpine.at/
Address	Alpine-Mayreder Bau GmbH Alte Bundesstrasse 10 A-5071 Salzburg-Wals
URL	http://www.alpine.at/
Phone/fax	Tel:+43/662/8582-11 Fax: +43/662/8582-31
E-mail	siegfried.mueller@alpine.at
Contact person *Name, department, phone, fax, e-mail*	Mr. Siegfried Müller siegfried.mueller@alpine.at Phone: +43 662 8582 401 Fax: +43 662 8582 400

Name	**3. Verbundplan**
Type of organization	○ Authorities: _____ ☒ Private enterprise ○ NGO ○ Other: _____
Other functions of project participant within the project	○ Sponsor ○ Intermediary ☒ Technical consultant ☒ Other: The Austrian Supplier Group _____
Main activities, knowledge and experience	http://www.verbundplan.at/
Address	Verbundplan GmbH Parkring 12 A-1010 Wien
URL	http://www.verbundplan.at/
Phone/fax	Telefon: +43/1/536 05-0 Telefax: +43/01/536 05-54748
E-mail	e-mail: vpl@verbundplan.at
Contact person *Name, department, phone, fax, e-mail*	Mr. Helmut Krisch Helmut.krisch@verbundplan.at Phone: +43 1 53605 54724 Fax: +43 1 53605 54748

A 4 LOCATION OF THE PROJECT ACTIVITY

A 4.1 Host country	
Host Country Party(ies) *(EB PDD A.4.1.1.)*	Bulgaria
Region/State/Province etc. *(EB PDD A.4.1.2.)*	District Smolyan
City/Town/Community etc. *(EB PDD A.4.1.3.)*	Devin Mihalkovo

A 4.2 Location of the project activity	
Detail on physical location, including information allowing the unique identification of this project activity *(EB PDD A.4.1.4.)* *Please enclose a map of the project location.*	The Vacha Cascade JI Project is situated in the Rhodope Mountains along the Vacha River in the southern Part of Bulgaria. The rehabilitation project of the existing power stations and the flooded area of the future reservoir of Tsankov Kamak power station are located in mainly deforested rocky terrain and unproductive vegetation. That region is part of the low-mountain forest landscape. Its altitude along the river course is between 580m and 685m. The highest peaks in the considered region are Shodensky (1,305m), Mogila (978m), Irizova Chuka (1,305m) and Kurom (1,386m). The Tsankov Kamak Project will be constructed entirely in the territory of Devin municipally. Devin has an area of 575 km² in the Southeast of the Rhodope mountains. It constitutes 17.83% of Smolyan Province. The population of the municipality was 15,396 people in 2001. Therefore the population density is about 37 people/km², so the territory is comparatively sparsely populated. The Tsankov Kamak Hydro Power Plant will be part of the Dospat-Vacha Cascade, which includes three dams, one daily equalizer and four hydro power plants. The Dospat Dam possesses a reservoir for multi-annual water equalizing. Under the dam the Teshel HPP is situated. After the Teshel HPP the water goes to the Teshel equalizer. Downstream is the Devin HPP with two Francis hydro groups, 40 MW each. After the Devin HPP comes the Vacha dam, which is equalized annually. Its' maximal capacity is 226 million m^3. Following the Vacha Dam the Orpheus PSHPP is constructed, with four Francis hydro groups, 40 MW each. The Krichim Dam serves as lower equalizer. The last step of the cascade is the Krichim HPP, with two Francis hydro groups, 40 MW each. Between the Devin HPP and the Vacha Dam the Tsankov Kamak Dam and HPP will be constructed. Bulgaria Map: Chapter III.A Annex 1: Bulgaria Map Site Plan: Chapter III.B Annex 2: Site Plan Vacha Cascade Vertical Schema Vacha Cascade: Chapter III.L Annex 12: Vacha Cascade Vertical Scheme Schematic Layout Vacha Cascade: Chapter III.K Annex 11: Vacha Cascade Schematic Layout

Is the location in a nature reserve?	○ Yes ☒ No
Will the project have effects on residents? *(e.g. noise, smell, other immissions, additional infrastructure, ...)*	During operation, the projects will have no negative effect on local inhabitants. For the hydro power plants already under operation, no changes are planned which would have an effect on local inhabitants. The Tsankov Kamak project will – due to the fact that hydropower is used – have no local emissions. Noise levels outside the powerhouse will be below Bulgarian standards.

A 5 SCHEDULE

A 5.1 Schedule		
Starting date of the project activity *(e.g. start of construction)* *(EB PDD C.1.1.)*	2003	
Construction period	2003-2007	
Construction phases	Measures	Duration
	HPP Tsankov Kamak	2003-2007
	HPP Teshel	2003-2005
	HPP Devin	2003
	PSHPP Orpheus	2004-2006
	HPP Krichim	2005-2006
Date of commissioning	Chapter III.C Annex 3: Time Schedule Vacha Cascade JI Project	
Expected operational lifetime of the project activity *(in years and months, e.g. two years and four months would be shown as: 2y-4m)* *(EB PDD C.1.2.)*	50 years	

A detailed project schedule is to be enclosed.

The crediting period corresponds to the period during which 'creditable' emission reduction certificates can be generated.

JI Projects

The Marrakesh Accords do not specify for how long emission reduction certificates can be generated by a JI project. It can however be assumed that the crediting period will correspond to the first commitment period (2008 - 2012).

CDM Projects

The crediting period of CDM projects is stipulated in the Marrakesh Accords as follows:

- 7 years with two extension options (each with renewed baseline determination), i.e. a maximum total of 21 years,
- once 10 years with no renewal option.

Crediting of the Certified Emission Reductions, CERs, can be performed retroactively from the year 2000. Contractual parties having carried out CDM projects since 2000 must be able to prove the fulfilment of the CDM criteria to be retrospectively credited CERs.

A 5.2 Choice of the crediting period	
JI projects	Starting date of the crediting period (DD/MM/YYYY): 01/01/2008 In addition to credits generated in the first commitment period (2008 to 2012), the project will reduce CO_2 emissions before 2008. It is intended that Assigned Amount Units (AAUs) equivalent to these emission reductions are transferred during the first commitment period.
	Duration of the crediting period: ___5 years_____
CDM projects *(EB PDD C.2.1., EB PDD C.2.2.)*	○ Renewable crediting period *(at most seven years per period)* ○ Fixed crediting period *(at most ten years)*
	Starting date of the (first) crediting period (DD/MM/YYYY): _____
	Length of the (first) crediting period: _____ *(in years and months, e.g. two years and four months would be shown as: 2y-4m)*

A 6 TECHNICAL DESCRIPTION OF THE PROJECT

A 6.1 Technology to be employed by the project activity	
Project technology used and listing of all measures *Please refer to Appendix 2.* *(EB PDD A.4.3.)*	All equipment to be utilized in the Vacha Cascade is proven state-of-the-art technology. The technology transfer will be realized by the internationally reputable Austrian supplier group. The technology to be employed by the Vacha Cascade Project activities is described for the three main parts – the Tsankov Kamak Power Station, the Tsankov Kamak Dam Reservoir and the technology employed by the Rehabilitation Project at the existing Power Stations Teshel, Devin, Orpheus and Krichim. **Tsankov Kamak Power Station:** The average net head is 133.7 m, therefore the rated power capacity is 80 MW, generating 198 GWh/a. The annual utilization hours are 2,475 h. The power conduit comprises an intake structure, situated in the Grashina valley of low-pressure riverside type and a underground penstock with 4.5 m diameter, steel-lined and self-supported. After a vertical shaft with a height of 51 m a slightly inclined section follows, 526 m long and a collector (manifold) section. The power station is situated near the slope in order to provide sufficient space for an outdoor switchyard. The tailrace channel is about 700 m long, the necessary Vacha River regulation is approximately 1300 m long. The equipment of the power station comprises: 2 Francis Turbines — P_{design} = 41171 kW each Turbine Speed — 428.6 r.p.m. 2 Generators rated power — 46 MVA each voltage — 10.5 kV with all necessary ancillary equipment. Two main step-up transformers will be installed in bays outside the building in the switchyard with 50 MVA rated capacity each. Voltage ratio is 10.5/242 kV. The power plant can be operated in automatically local controlled mode, and also remotely from the South regional dispatching control center. All necessary equipment is foreseen. **Tsankov Kamak Dam Reservoir:** The Tsankov Kamak Dam Reservoir is situated in the Vacha River Valley near the village of Mihalkovo. The dam site is at a distance of about 400 m downstream from the confluence of the Vacha River and the Gashina creek. The reservoir stretches upstream to the town of Devin. The maximum water level will only slightly have an influence on existing infrastructure and has been concerted with the relevant local authorities. The main parameters of the dam are as follows: Dam Crest Elevation — 688.50 m a. s. l.

	Dam Height from Foundation Level 125.50 m Dam Height from Thalweg 110.00 m Crest Length 460.00 m Crest Width 8.80 m The dam is situated under favorable topographic and geological conditions: At the end of a narrow valley stretch and mainly in sound granites and gneisses. At the left side of the valley there is a fracture zone (Mylonites) with a width of approximately 7 meters, which will be filled with concrete. However there are no major problems expected in this respect. The dam structure will comprise a bottom gallery, which will serve as a drainage gallery as well and which will be used for the grouting works. The gated spillway is situated at the dam crest and is designed for 1500 m^3/s discharge, this is 10,000 years return interval. The stilling basin at the dam toe is also used for the bottom outlet, equipped with two steel pipelines. Via the bottom outlet it is possible to release the water stored within 25 days. Furthermore a pipeline for residual flow for ecological purposes is foreseen, which can supply 0.73 m^3 /s discharge into the river. The possibility for a mini hydropower plant with a power capacity of approximately 1 MW using this discharge is considered. **Rehabilitation Project:** The Vacha Cascade uses the energy potential of the waters coming from the central and the western parts of the Rhodope Mountains. Until 1984 six hydro power plants had been commissioned as follows: **Teshel HPP** Francis turbines total capacity – 60 MW **Devin HPP** Francis turbines total capacity – 80 MW **Orpheus PSHPP** Francis turbines total capacity – 160 MW **Krichim HPP** Francis turbines total capacity – 80 MW Two further small hydro power stations, Vacha I HPP and Vacha II HPP with a total installed capacity of 20,6 MW, are located in the lower part of the Cascade. An overall rehabilitation is foreseen for the Orpheus and Krichim power plants. The refurbishment project at the Teshel HPP and Devin HPP comprises the mechanical part and the electrical). The following section gives an overview on the technical data and planned refurbishment activities at the four hydro power stations: **Teshel HPP** Mechanical Part: 2 pcs. of governors with new servo-motors 2 pcs. of runners, sealing rings, coupling bolts and deaeration system turbine bearing

	Electrical Part: 2 excitation systems 2 electric braking systems control system with spare parts joint controller 0.4 kV switchgear with spare parts 220 V switchgear with spare parts **Devin HPP** Mechanical Part: 2 pcs. of governors with new servo-motors 2 pcs. of runners, sealing rings, coupling bolts Electrical Part: electric braking systems control system with spare parts joint controller 0.4 kV switchgear with spare parts 220 V switchgear with spare parts relay protections with spare parts **Orpheus PSHPP and Krichim HPP** An overall rehabilitation has been foreseen for both power plants, starting with the laying of an anticorrosive coating on the penstocks, replacement of runners, upper covers, labyrinths, upper and lower bearings, governors, servo-motors, butterfly valves, lubrication systems, drainage systems, excitation systems, generator circuit breakers, control systems, relay protections, diesel-generators, supply and control cables, connections to NDC (National Dispatch Center), as well as some auxiliary civil works.

A 7 PROJECT ORGANISATION

A 7.1 Economic aspects	
Public funding of the project activity *Level and source of public funding for the project activity, including an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of the funding Parties* *(EB PDD A.4.5.)*	No public funding is provided for this Project. €
Economic viability *A detailed financing plan and an economic viability calculation (for at least 15 years) has to be enclosed. Please refer to Appendix 1.*	The following section shows the actual financial analysis of the Vacha Cascade JI project. The corporate tax rate reduction (1. January 2004) to 19.5% is taken into consideration. The financial analysis of Tsankov Kamak HPP has been elaborated in draft form due to the status of the project. The most important sources and framework conditions financial analysis of Tsankov Kamak HPP are listed below; the concrete figures assumed are given in the table at the end. At the time being, investment cost is contractually laid down. The contract value of Alpine is Euro 108,664.000, VA Tech Hydro's remuneration is Euro 47 mio, Verbundplan's contract value is about Euro 6,125 mio. Contingencies are considered in the amount of Euro 4 mio. The cost of road relocation amounts to estimated Euro 25 mio. According to Energoproekt Hydropower Ltd, for the relocation of the road Euro 12,5 mio have to be calculated, the other half of the cost has to be attributed to infrastructure improvement which is not attributable to the HEPP. Therefore, total investment cost in the financial analysis is Euro 178,289.104. Operation costs have been calculated as a percentage of investment cost (excluding road construction) usually applied in international HPP's. The kWh output is based on the hydrological data included in the feasibility study of Energoproekt (Vol. I Summary Report), dated March 2001, and is composed of the output of Tsankov Kamak HPP and half of output increase of the Vacha cascade as calculated by NEK. The increase in the cascade output is due to the construction of Tsankov Kamak as well as refurbishments of existing plants. A factor of 0,5 has been applied to calculate additional output. The tariff estimation and the related escalation was accorded with Verbund's subsidiary Austrian Power Trading (APT) and is within the frame of Energoproekt's study. The escalation reflects the increasing importance of peak load. In order to compute the revenues generated by sale of Emission Reduction Units (ERUs), the reduction figure of the baseline study and an estimated price subject to further negotiations were assumed. Only the prospective five

years' period was taken into account. Potential trading after this period is not considered.

The internal rate of return applied reflects the yield that could be achieved in the secondary market (Bulgarian government bonds).
The corporate tax rate is assumed to remain stable over production period.
On the financing side, the interest rates and fees offered to NEK were considered. The sum of financing cost was calculated on the basis of linear disbursements and repayments.

The conditions of Österreichische Kontrollbank AG were supplemented by the "Rahmen I" interest rate which is based on a 90% fixed and 10% variable interest rate.

Factor	**Figure**
Construction phase	4 years
Operation phase	30 years
Investment cost	Euro 178,289.104
Operation cost	1% p.a. of investment cost (excl. road)
kWh output HPP	198 GWh
kWh output, additional(Vacha cascade)	8 GWh
kWh tariff	6 Cent
kWh tariff escalation	4% p.a.
ERU output	210.950 tons CO2
ERU price	Euro 10 per ton
ERU administration cost	1% of sales
Internal rate of return	5,80% p.a.
Corporate tax rate	19,5%
Sum of financing cost (discounted)	Euro 64.350.236

Macroeconomic data have not been considered.

The financial viability was measured by the Net Present Value (NPV) exceeding IRR.
It is assumed that the investor, NEK, aims at covering the financing cost by discounted project revenues.

Net Present Value including ERU revenues: Euro 71.302.911
Net Present Value excluding ERU revenues: Euro 64.456.536

NPV required (ie, Financing cost): Euro 64.350.236

From the above table it can be seen that ERU trading plays an important role regarding the financial viability of the project. It serves not only as security for the loans but makes the project viable in terms of financial analysis.

An important ratio is investment cost/kWh respectively investment + financing cost/kWh:

Ratio	**Value (Euro)**
Investment cost/kWh	O,848
Investment + Financing cost/kWh	1,187

Indicative offer price for ERUs/CERs *Please include an illustration of the price calculation and of the underlying assumptions.*	26 Euro. This is a first price indication and is subject to negotiations with Kommunalkredit Austria AG. Please see chapter III.D Annex 4: Letter NEK to Kommunalkredit Austria AG

A 7.2 Legal aspects	
Status of the official approval process in the host country	The Bulgarian Ministry of Environment and Water fully supports the Vacha Cascade JI Project and has endorsed the project as a pilot Joint Implementation project in the context of the Memorandum of Understanding signed between the Republic of Bulgaria and the Republic of Austria. The Letter of Endorsement can be found in chapter III.H Annex 8: Letter of Endorsement Vacha Cascade Project. The Bulgarian Ministry of Environment has made a decision on the environmental impacts of the Tsankov Kamak project. On the grounds of Art. 81, para. 1 it. 2 and Art. 99, para. 2 of the Environmental Protection Act and Art. 20, it. 1 of Regulation No. 4/98 on the Environmental Assessment, the Republic of Bulgaria permits the Tsankov Kamak Hydro Power Project to move to the next Project Design phase for the following reasons: • The issued EIA Report presents, to an adequate extent of completeness and detail, information on the condition of the environment, forecasts of the possible impacts as well as mitigation or preventive measures against any negative consequences. • No significant changes in the main climate parameters are expected in the overall water intake area of the river of Vacha and the adjacent regions as a result of construction and operation of Tsankov Kamak Dam. • In the process of public discussion, no objections were raised verbally or lodged in writing against construction of the integrated water-power system, or any proposals for major design modifications with a view to protection of the environment or human health. The decision can be found in III.G Annex 7: Republic of Bulgaria, Ministry of Environmental: Decision on Environmental Impact Assessment The Bulgarian Ministry of Finance and the Bulgarian Ministry of Energy and Energy Resources will issue a Letter of Support to secure the legal basis on the Bulgarian side for the financing scheme envisaged.

B Ecological, Socio-Economic and Development Aspects

According to article *EB PDD F.1.* documentation on the analysis of the environmental impacts, including transboundary impacts, shall be provided. This documentation has to be attached to the CDM EB PDD. If the impacts are considered significant by the project participants or the host Party, according to *EB PDD F.2.*, conclusions and all references to support documentation of an environmental impact assessment that has been undertaken in accordance with the procedures as required by the host Party shall be provided.

The Austrian PDD asks for the following specifications.

B 1 ECOLOGICAL EFFECTS OF THE PROJECT DURING CONSTRUCTION

The following section deals with the environmental effects of the project activity during the construction phase. Significant effects on the media *water* and *air* and with regard to *waste* and *noise* shall be described in detail as well as mitigation measures undertaken. Relevant regulation (national laws, directives etc.) has to be complied with. If nonexistent or not applicable the current national technological practice/standards are to be observed. Please also describe in detail if your project activity goes beyond these minimum requirements.

Ecological Effects: Introduction Vacha Cascade JI Project	The rehabilitation projects at the Teshel, Devin, Orpheus and Krichim HPPs will not result in any environmental impacts, as the power plants already exist and only modifications leading to an increased efficiency will be executed. Therefore the following section deals only with the Tsankov Kamak project, excluding the rehabilitation project. **Environmental Impact Assessment** - Tsankov Kamak Integrated Water-Power System: For the Tsankov Kamak HPP project a comprehensive Environmental Impact Assessment (EIA) has been carried out by registered independent experts. On the basis of the results and conclusions achieved in the Environmental Impact Assessment (EIA), Report on Tsankov Kamak Integrated Water-Power System, taking into account the restrictions and requirements set and recommendations made, the Independent Experts who developed the EIA Report recommends that a permission is granted to proceed to the next design phase. The EIA was presented to the Bulgarian Ministry of Environmental. Please find attached the decision on the Environmental Impact Assessment in III.G Annex 7: Republic of Bulgaria, Ministry of Environmental: Decision on Environmental Impact Assessment. The EIA is attached in Annex 5: Environmental Impact Assessment Tsankov Kamak Integrated Water-Power System Volume 1 and Annex 6: Environmental Impact Assessment Tsankov Kamak Integrated Water-Power System Volume 2. **Technological STANDARDS** **I Civil Works** **GENERAL** Generally Bulgarian standards and codes shall be used whenever applicable. For certain particular materials, workmanship or tests for which Bulgarian standards do not exist, other internationally recognized standards and codes may be used. **EQUIVALENCY OF STANDARDS AND CODES** Where the Contract provides requirements for materials to be furnished, and work performed or tests conducted, by specifying a standard which has its origin in one country, it is not the intention to restrict the requirements solely to that standard and that country. Where such standards and codes are national, or relate to a particular country or region, other authoritative standards including standards of other countries which ensure an equal or higher quality than the standards and codes specified will be accepted subject to the Engineer's prior review and written approval. In this case the Contractor shall submit to the Engineer the proposed standards and codes and written proof that his proposed standards are equivalent in all significant respects to the standards specified at least 15 working-days prior to the date when the Contractor desires the Engineer's approval. In the event the Engineer determines that such

proposed deviations do not ensure equal or higher quality, the Contractor shall comply with the standards and codes specified in the Contract. Dates of specified standards and codes are not generally provided in the Specifications or indicated on the Drawings. Where dates are not shown or specified or indicated, standards and codes will be those in effect 28 days prior to signing of the contract.

ABBREVIATIONS OF STANDARDS AND CODES

Standard specifications and codes of the following listed authorities wherever quoted herein are referred to by use of the abbreviations shown below:

AUTHORITIES and ABBREVIATION

Balgarski Darzhaven Standart (Bulgarian Government Standard) Committee of Standardization and Metrology: **BDS, BDS EN**

European Committee for Standardization: **EN**

International Organization for Standardization**: ISO**

Deutsches Institut fur Normung: **DIN**

American Association of State Highway and Transportation Officials: **AASHTO**

European Federation of Producers and Contractors of Spezialized Products for Structures: **EFNARC**

Copies of specifications, codes or standards of the above organizations may be obtained at the addresses shown.

II. MECHANICAL AND ELECTRICAL PART

Standards

In principle, the equipment must meet the latest issues of the respective standards. With respect to the equipment design, materials and production, the company and national standards of Austria, Germany and other international standards should be taken into account, for example:

- IEC, ISO (International Standard)
- EN (European Standard)
- ASTM, ASME (American Standards)
- VDI, VDE, DIN (German Standards)
- IEEE (International Standard)

Remark: The particular standards, according to which the Project is designed and must be implemented, are described in the respective parts of TERMS OF REFERENCE. They are part of the Contract for Equipment Production, Supply and Installation.

Please find attached the order for improving the technical operation of HPPs: Chapter III.P Annex 16: Order for improving technical operation of HPP.

B 1.1 Environmental effects during construction	
Environmental effects during construction	Environmental effect: _____Water_____ Mitigation measures: _____EIA 114-124_____ The main part of pollution of the Vacha and Gashnia is caused by the high content of undissolved particles (resulting from drilling works, sprinkling for reducing the dust in underground works, from scouring of rock surfaces, from handling of materials and other technological processes). The following measures are taken: • Organization of maintenance of the building machinery and the car pool • Determination of quantities and grade of effluents and sewage from all sources and submit a design solution for treatment of the sewerage generated during the construction of the dam and hydro power stations • Support the construction of a sewerage treatment plant in Devin • Car fleet: strict supervision of physical conditions as part of the constructing organization • Organize control of fuel and lubricant storage facilities and the condition of machines so as to prevent accidental oil spills. Detailed Information: EIA pages 19 – 20; 38-58; 114-124 o Compliance with relevant regulations/national technological standards o Relevant regulation: o Environment Act (State Gazette No.86/1991; No.85/1997; No.26/2001) o Waters Act (SG, No. 67, 1999) o Regulation No. 7 – "Indicators and Limits for Determining the Permissible Pollution Levels of Different Categories of Surface Water" o Order No. RD–272/03.05.2001 "On the categorization of surface waters in water bodies or in parts thereof" o Regulation No. 6 of the Ministry of Environment and Waters (MEW), the Ministry of Regional Development and Public Works (MRDPW), the Ministry of Health (MH) and Ministry of Economics (ME) of 09.11.2000 on „Emission Standards for Permissible Quantities of Harmful and Dangerous Substances in Wastewaters Discharged in Water bodies“ (SG No. 97/2000) o Regulation No. 5 on establishing water monitoring (SG, No. 95/2000) o Regulation No. 1/2000 on the prospecting, utilization and protection of ground waters (SG, No. 57/2000) o Regulation No. 10 of 03.07.2001 on the granting of permits for outfall of waste waters into water bodies and imposing of individual emission restrictions upon pollution point sources (SG, No. 67/2001)

	(Please indicate where and how it is available.) o National technological practice/standard: _____ *(Please state references.)* Does the project go beyond these minimum requirements? o No o **Yes**: The Vacha Cascade JI project applies reliable International, Austrian, German, European and US codes and standards. Moreover, the project is in compliance with all relevant EU regulations and directives concerning the environment, therefore it goes beyond the Bulgarian environment legislation requirements.
Environmental effects during construction	Environmental effect: _____Air_____ Mitigation measures: _____EIA_114-124_____ In order to minimize air pollution, the engineering design should provide for adequate steps towards the suppression of such emissions by means of engineered devices and technologies applied in similar cases such as: • Special-purpose trucks for water sprinkling on the temporary service roads, in dry weather and heavy traffic; • The pulsed release of dust upon blasting will be efficiently suppressed by sprinkling. • Conditions for pollution with noxious gases will be created on the site because the intensive use of transport vehicles and building machines with diesel traction results in increase of their concentrations. In order to reduce the specific emissions by 25–35%, up-to-date devices for regulation of internal-combustion engines (ICE) should be used. • Organize maintenance of the building machinery and the car pool with a view to lower specific emissions of gases and soot from internal combustion engines. • The engineering design should relevancy of erecting a second concrete center on the outskirts of Mihalkovo – from environmental and operational point of view. Detailed Information EIA: pages 19 – 20; 22-38; 114-124 o Compliance with relevant regulations/national technological standards o Relevant regulation: _____ o Environment Act (State Gazette No.86/1991; No.85/1997; No.26/2001) o Free Air Purity Act (State Gazette No.45/1996 as amended in No.27/2000); o Regulation No7 from May 3, 1999 for estimation and management of the quality of atmospheric air (SG 45/1999);

	o Regulation No9 from May 3, 1999 for standards of SO2, NOx, PM and Pb in the atmospheric air; o Regulation No10 from October 6, 2003 for standards for admissible emissions (concentrations in exhaust gases) of SO2, Nox and common dust emitted in atmospheric air from Large Combustion Plants *(Please indicate where and how it is available.)* o National technological practice/standard: _____ *(Please state references.)* Does the project go beyond these minimum requirements? o No o **Yes**: The Vacha Cascade JI project applies reliable International, Austrian, German, European and US codes and standards. Moreover, the project is in compliance with all relevant EU regulations and directives concerning the environment, therefore it goes beyond the Bulgarian environment legislation requirements.
Environmental effects during construction	Environmental effect: _____Waste_____ Mitigation measures: _____EIA_____ The following measures are taken • Excess or unfit for building purposes earth and rock masses as well as the wastes from individual construction sites shall be sent to the assigned disposal sites by road motor vehicles using the access service roads. • Domestic wastes shall have a disposal site assigned to them during both the construction phase and the operation phase and shall be sent to such disposal site by road motor vehicles. • According to the development strategy of the municipality of Devin, a domestic waste disposal site is to be built before 2004 (the time schedule has taken into account the new route of Road No. III–868). • The milestones and opportunities for using the domestic waste disposal site in Devin for the needs of Tsankov Kamak HPP shall be incorporated in the engineering design. • The construction of the Devin disposal site shall be expedited. • Spent fuels and lubricants shall be mandatory collected in special tanks with the proper lining preventing soil and water pollution. • The engineering design shall specify the intervals and routes of hauling such wastes to the recycling plants. • The engineering design shall specify temporary warehouses for scrap where it will be kept before sending it for reprocessing. • The method of sewerage treatment shall be clarified, and the engineering design shall provide the engineering solution for both the construction and operation phase of Tsankov Kamak HPP. • During the Engineering Design phase, design solutions for management of all types of wastes shall be submitted, such as generation, collection, haulage, disposal (site, technology, utilization of existing disposal sites near the project site, etc.)

	The Ministry of Environment permits the Tsankov Kamak Project going on to the next Project Design phase on the condition, that a study of opportunities and an optimal solution of the problem with utilization/disposal of the construction waste and garbage generated in the construction process. Detailed Information EIA: pages 19 – 20; 59-60; 114-124 o Compliance with relevant regulations/national technological standards o Relevant regulation: o Environment Act (State Gazette No.86/1991; No.85/1997; No.26/2001); o Restriction of Harmful Waste Impact on the Environment Act (State Gazette No.86/1997); o Regulation for requirements for treatment and transportation of residual oil and waste oil products (SG 59/2000); Regulation for requirements for treatment and transportation of industrial and hazardous waste _____ *(Please indicate where and how it is available.)* o National technological practice/standard: _____ *(Please state references.)* Does the project go beyond these minimum requirements? o No o Yes: The Vacha Cascade JI project applies reliable International, Austrian, German, European and US codes and standards. Moreover, the project is in compliance with all relevant EU regulations and directives concerning the environment, therefore it goes beyond the Bulgarian environment legislation requirements.
Environmental effects during construction	Environmental effect: _____Noise_____ Mitigation measures: _____EIA_____ The main noise source for the settlements in the region of the project site will be the heavy-duty transport to and from the construction site. The following measures are taken: • Taking into account the proximity to settlements and prohibiting any operation from 10.00 p.m. till 06.00 a.m. • Providing for 40 km/h speed limit for heavy-duty trucks crossing settlements and permitting heavy duty traffic only during the light hours of the day. o Compliance with relevant regulations/national technological standards

	o Relevant regulation: _____ *(Please indicate where and how it is available.)* o National technological practice/standard: _____ *(Please state references.)* Does the project go beyond these minimum requirements? o No o **Yes:** ___Voluntary self-regulation (speed limits; outage)_____

Please extend the table if necessary.

B 2 ECOLOGICAL EFFECTS DURING THE PROJECT LIFETIME

The following section deals with the environmental effects of the project activity during the project lifetime. Significant effects on the media *water* and *air* and with regard to *land use, biodiversity* and *waste* shall be described in detail as well as mitigation measures undertaken. Relevant regulation (national laws, directives etc.) has to be complied with. If nonexistent or not applicable the current national technological practice/standards are to be observed. Please also describe in detail if your project activity goes beyond these minimum requirements or displays other positive effects.

Water

B 2.1 Effects on the medium water	

Effects on the medium water *(e.g. abstraction of ground or surface water, pollution of surface water, composition of effluents etc.)*	○ Not present ☒ Present Environmental effect: Detailed analysis are prepared by registered independent experts and shown in the Environmental Impact Assessment for the Tsankov Kamak Integrated Water-Power System, in particular chapter 3.2 (pages 37-58). The EIA is attached in Annex 5: Environmental Impact Assessment Tsankov Kamak Integrated Water-Power System Volume 1 and Annex 6: Environmental Impact Assessment Tsankov Kamak Integrated Water-Power System Volume 2. Mitigation measures: _____EIA_____ o Compliance with relevant regulations/national technological standards o Relevant regulation: o Environment Act (State Gazette No.86/1991; No.85/1997; No.26/2001) o Waters Act (SG, No. 67, 1999) o Regulation No. 7 – "Indicators and Limits for Determining the Permissible Pollution Levels of Different Categories of Surface Water" o Order No. RD–272/03.05.2001 "On the categorization of surface waters in water bodies or in parts thereof" o Regulation No. 6 of the Ministry of Environment and Waters (MEW), the Ministry of Regional Development and Public Works (MRDPW), the Ministry of Health (MH) and Ministry of Economics (ME) of 09.11.2000 on „Emission Standards for Permissible Quantities of Harmful and Dangerous Substances in Wastewaters Discharged in Water bodies“ (SG No. 97/2000) o Regulation No. 5 on establishing water monitoring (SG, No. 95/2000) o Regulation No. 1/2000 on the prospecting, utilization and protection of ground waters (SG, No. 57/2000) o Regulation No. 10 of 03.07.2001 on the granting of permits for outfall of waste waters into water bodies and imposing of individual emission restrictions upon pollution point sources (SG, No. 67/2001) _____ *(Please indicate where and how it is available.)* o National technological practice/standard: _____ *(Please state references.)*

	Does the project go beyond these minimum requirements? o No o **Yes:** The Vacha Cascade JI project applies reliable International, Austrian, German, European and US codes and standards. Moreover, the project is in compliance with all relevant EU regulations and directives concerning the environment, therefore it goes beyond the Bulgarian environment legislation requirements.
	☒ Positive effects: YES • A Reservoir Management Plan including requirements with respect to fish farming, reservoir operation maintenance of the zones along the banks of the lake and its tributaries will be developed. • Downstream of the Tsankov Kamak HPP, whenever the power station does not operate, there is an additional improvement of the river flow conditions as a result of confluence of the rivers Mihalkovska and Lesnovska which supply up to 190 l/s during summer-time low water. Detailed information EIA: pages 38 -58

Air

B 2.2 Effects on the medium air	

Effects on the medium air *(e.g. quantity of emissions rejected, composition of emissions, etc.)*	○ Not present ☒ Present Environmental effect: ____Additional Emission Reduction_____ Mitigation measures: Detailed information: EIA pages 22 – 37 and Baseline Study Environmental Effects on the medium air: • Since hydropower is the most important renewable energy source in Bulgaria, additional emissions (apart from CO_2 emission reductions) of SO_2, NOx, other greenhouse gases, dust and soot will be avoided. The following emission quantities will be additionally reduced in the period 2008-2012: ▪ **SO_2 – about 39,000 tons** ▪ **NO_x – about 2,600 tons** ▪ **PM – about 5,200 tons** ▪ **CH_4 – about 6 tons;** ▪ **N_2O – about 9 tons;** • Improvement of humidification conditions (especially during the dry season) and slight increase of the overall air humidity above the dam and in its immediate vicinity. • The fast flowing (turbulent) water masses (in the hydro-power station turbines, in the stilling basin and in other places) improve the ion balance of air – mainly through the larger number of anions which have been proven to have a beneficial effect on human health (prof. B. Baikov, 1989) Detailed information: EIA pages 22 – 37 and Baseline Study o Compliance with relevant regulations/national technological standards o Relevant regulation: o Environment Act (State Gazette No.86/1991; No.85/1997; No.26/2001) o Free Air Purity Act (State Gazette No.45/1996 as amended in No.27/2000); o Regulation No7 from May 3, 1999 for estimation and management of the quality of atmospheric air (SG 45/1999); o Regulation No9 from May 3, 1999 for standards of SO2, NOx, PM and Pb in the atmospheric air; o Regulation No10 from October 6, 2003 for standards for admissible emissions (concentrations in exhaust gases) of SO2, Nox and common dust emitted in atmospheric air from Large Combustion Plants *(Please indicate where and how it is available.)* o National technological practice/standard: _____ *(Please state references.)*

	Does the project go beyond these minimum requirements? o No o **Yes:** The Vacha Cascade JI project applies reliable International, Austrian, German, European and US codes and standards. Moreover, the project is in compliance with all relevant EU regulations and directives concerning the environment, therefore it goes beyond the Bulgarian environment legislation requirements.
	☒ Positive effects: _____Additional Emission Reduction_____ • . The following emission quantities will be additionally reduced in the period 2008-2012: ▪ SO_2 – about 39,000 tons ▪ NO_x – about 2,600 tons ▪ PM – about 5,200 tons ▪ CH_4 – about 6 tons; ▪ N_2O – about 9 tons;

Land

Details on land use are normally only to be stated for Avoidance projects.

B 2.3 Land use	
1. Introduction:	The total area of soil that will permanently destroyed upon implementation of the Tsankov Kamak Project, amounts to 285.7 hectares. The project is situated in the zone of forest brown light (35.8%), transition soils (9.8%), maroon washed forest soils (35.3%); some alluvial (2.2%) and alluvial-deluvial soils (16.9%) occur on flooded river terraces. **Brown forest light soils**. They are situated in places of sunny exposure (S, SE, SW, W). Their depth is small – about 0 – 30 cm, shallow, seldom too shallow. In terms of mechanical composition they are slightly sandy-clayey, medium to highly stony, with good aeration but poorly supplied with nutrients: the humus in stratum A is about 1,5–2,5% on the average, and total nitrogen 0,05 to 0,08%. They are moderately supplied with potassium and poorly – with phosphoric compounds. The soil reaction is acidic – pH is between 4,0 and 6,0. Their fertility is poor – it supports poor, seldom very poor vegetation – $B_{1,2}$; $A_{1,2}$ (IV and V site quality class (estimated productivity) for forest vegetation). **Brown forest transition soils.** They occupy more shady sites in glens and less steep slopes. The soil layer is deeper – 30-60 cm, moderately deep. Their mechanical composition is also sandy-clayey, medium to highly stony, with good aeration. They are better supplied with nutrients: the humus in stratum A is 2,5 to 3,5%, on the average, and in stratum B it is 1,0 - 2,0%; total nitrogen ranges within 0,08 to 0,10%. They are moderately supplied with potassium and poorly – with phosphoric compounds. Their soil reaction is also acidic – pH is between 4,0 and 6,0. Their fertility is moderate – it provides medium rich conditions for forest vegetation – C_1; $C_{1,2}$; C_2 (I–III site quality class mainly die to the improved humidity). **Maroon forest washed soils**. These soils cut into the gorge of Vacha like a narrow pawl from the Thracian lowland and occupy grounds in the northern part of the reviewed region, mainly in the territory of Mihalkovo Forestry. In general, they are less fertile that the brown forest soils, more shallow, with light mechanical composition, often highly stony, and their washing out is a result of the Mediterranean influence. Ferrous hydroxides do not penetrate in depth, which is the cause of their reddish-brown color. They are often degraded by erosion and washing away of the upper strata by the age-long human activity. The soil reaction is mildly acidic (pH 4,5–5,5). Stratum A is lightly sandy-clayey, and stratum B is compacted to moderately sandy-clayey. The humus in stratum A is seldom more than 2%, and under it – about 1% and less, depending on the extent of washing. Poorly supplied with phosphoric compounds and potassium. The natural forest vegetation is mostly degraded in consequence of unreasonable human activity and, during the recent decades, its reconstruction was started through replacement with pioneer, mostly coniferous tree species. **Alluvial soils.** Fragments of these soils occur in the bed of the Vacha which is quite wide in places and forms alluvial meadows. They are highly stony and hardly permit the development of vegetation on them. They do not have a pronounced genetic stratum "A". **Alluvial-meadow soils**. These soils were formed after the appearance of permanent herbaceous vegetation on the alluvial sediment. That enabled the formation of an initial genetic stratum "A". In the site reviewed they occur in two larger (such as Zabral etc.) and numerous smaller complexes. The permanent herbaceous vegetation and the proximity of ground water predetermine a higher fertility of these

	soils (humus in stratum "A" up to 0,6–0,8%). They are medium deep to deep, medium to high stony. Parts of them are used as natural meadows, and another part is tilled by the population for growing of potatoes, vegetables, etc. For that reason alluvial-meadow soils may be viewed as antropogenous-agrogenous soils. Detailed information: EIA pages 19; 64 - 104
2. Erosion	Since the ground is highly rugged, mountainous, with very steep slopes and due to past devastation's of the forest vegetation by illegal cutting of trees and uncontrolled livestock pasture, the soils were exposed to erosion for many decades and suffer of obvious disbalance of the normal soil strata. The steep slope gradients have contributed to washing away of Stratum A, and heavy rains have caused soil slips so quite often they behave like "slope banks", with different degrees of shuffling of strata A, B and C. The wind conditions is determined by the situation of the region in relation to the main routes of movement of the synoptic objects and by the altitude. The average wind velocity in places at altitudes up to 1200-1300 m is about 1 m/s in the summer months, and reaches 2 m/s during the colder months of the year. The wind velocity is significantly higher only in the higher parts of the catchment area. In winter its level is 6.0 m/s to 7.2 m/s, and in summer – 3.5 m/s to 5.0 m/s. The relief in the region has an additional effect, especially on the wind direction. That is why the wind direction most often follows that of river valleys. In exposed places the prevailing wind directions are from the west with a second maximum from the northeast or north. In the valley of Vacha, the winds most frequently blow from the south, with a second maximum from the west.
3. Hangslide	Construction of the Tsankov Kamak HPP is located at the Vacha river in the Central Rhodopi mountain. It is situated in the sectora between "Devin" Hydro-power Station (HPS) and Vacha Dam (sector "Sredna Vacha). The water-power system is in the territory of Province Smolyan. The area has a pronounced mountainous character. That part of the Rhodopi mountain has great altitudes, high watershed flats, deep ravines and large tectonic kettles. The upper and lower course of the river and its tributaries flow through deeply cut valleys with steep and vertical banks. Its altitude along the river course is between 685m and 580m. The highest peaks in the considered region are Shodensky (1,305m), Mogila (978m), Irizova Chuka (1,305m) and Kurom (1,386m). Picture Area Tsankov Kamak: III.I Annex 9: Tsankov Kamak Area

B 2.3 Land use	
Land use	_____2,857,000_ m^2
Effects on land use *(e.g. erosion, landslip etc.)* *Please provide at least 2-3 different pictures of the planned location of the project under different view angles and show the dimension of the buildings of the project on these pictures.*	○ Not present ☒ Present Environmental effect: _____Total area amounts to 285.7 hectares__ Mitigation measures: _____Detailed Information: EIA pages 19; 64-104_ o Compliance with relevant regulations/national technological standards o Relevant regulation: o Environment Act (State Gazette No.86/1991; No.85/1997; No.26/2001) o Protection of Air, Waters and Soil Against Pollution Act (State Gazette No.84/1963 as amended. …….No.45/1996); o Forestry Act (State Gazette No.125/1997); Regulation for National Geo-reserve (SG 6/21/01/2000) *(Please indicate where and how it is available.)* o National technological practice/standard: _____ *(Please state references.)* Does the project go beyond these minimum requirements? o No o **Yes:** The Vacha Cascade JI project applies reliable International, Austrian, German, European and US codes and standards. Moreover, the project is in compliance with all relevant EU regulations and directives concerning the environment, therefore it goes beyond the Bulgarian environment legislation requirements.
	○ Positive effects: _____

Biodiversity

Details on biodiversity are normally only to be stated for Avoidance projects.

B 2.4 Effects on biodiversity	
Effects on biodiversity *(Is the project situated in a protected zone, e.g. listed in a fauna or flora inventory?; Are there any fauna/flora species mentioned on Red Lists present on the area of the project location?[2]; Are there any endangered or indigenous plants or animals present on the area of the project location?; etc.)*	○ Not present ☒ Present The Tsankov Kamak Joint Implementation Project isn't located in a nature protection area. In the Bulgarian National strategy for protection of the biological diversity, the territory of the Sredna Vacha project is indicated as a region of medium and partly medium significance on the basis of summarized data on species diversity, endemic and rare taxa. Environmental effect: _____see below_____ **Vegetation diversity:** (see below) Detailed information: EIA pages 70 - 80 **Vegetation peculiarity:** (see below) .Detailed information: EIA pages 70 – 80 **Fauna diversity:** (see below) Detailed information: EIA page 80-100 Mitigation measures: __EIA_____ o Compliance with relevant regulations/national technological standards o Relevant regulation: o Environment Act (State Gazette No.86/1991; No.85/1997; No.26/2001) o Biodiversity Act (SG No77/09/08/2002) *(Please indicate where and how it is available.)* o National technological practice/standard: _____ *(Please state references.)* Does the project go beyond these minimum requirements? o No o **Yes:** The Vacha Cascade JI project applies reliable International, Austrian, German, European and US codes and standards. Moreover, the project is in compliance with all relevant EU regulations and directives concerning the environment, therefore it goes beyond the Bulgarian environment legislation requirements.

[2] For information on such species see e.g. IUCN: International Union for the Conservation of Nature (www.iucn.org/themes/ssc/).

	○ Positive effects: _____
Vegetation diversity	In the Bulgarian National strategy for protection of the biological diversity, the territory of the Sredna Vacha project is indicated as a region of medium and partly medium significance on the basis of summarized data on species diversity, endemic and rare taxa. The description of ligneous forest vegetation, herbaceous vegetation and rock plants goes beyond the scope of the document. A detailed description of the vegetation diversity is described in the EIA (quod vide EIA pages: 70-80). There are no grounds to maintain that the construction and operation of the site will cause irreparable damage. None plant is in danger of extinction. Detailed information: EIA pages 70 - 80
Vegetation peculiarity	There are no flora species mentioned on the Red Lists present on the area of the Vacha Cascade project location. The fact that the relative share of the area flooded by the dam is small compared to the whole region offers an opportunity for complete restoration of the flora in it. The various species of forest and herbaceous vegetation occur also above the lake ponding elevation, therefore they are not in danger of extinction Nevertheless, the flora and fauna studies in order to find the most appropriate solutions for preservation of the biodiversity will be continued during the design and construction phases. Detailed information: EIA pages 70 - 80
Fauna diversity	There are no fauna species mentioned on the Red Lists present on the area of the Vacha Cascade project location. A detailed description of the fauna diversity is shown in the EIA pages 80-110. The construction and operation of Tsankov Kamak HPP will result in transformation of the river invertebrate fauna. A new plankton community of limnobionts will form – invertebrates and algae – maybe more deficient in species, but with high productive and trophic potential. The changed characteristics of the environment due to the dam lake will result in the respective qualitative and quantitative changes of the ichtyofauna. The development of the ichtyofauna can be guided from the very beginning. With reasonable management, the reservoir has the potential of becoming a fish-husbandry and recreation site of regional significance. It shall be noted that none of the species established in the sector of Vacha river affected by the future dam construction has a national or international nature-protection status. The region sudied is deficient in herpetofauna and the established species do not have a significant conservation value. No significant negative effects for the existing mammalian fauna are expected. The long construction phase will permit most of the species to move to higher places without any detrimental effect on their feeding base. They will adapt to their new habitats comparatively easily, and their populations will retain their relative size. It cannot be said that the construction and operation of the site will cause irreparable damage on the ornitofauna in the region.

	Detailed information: EIA page 80-100

Waste

B 2.5 Waste	
Waste generation, treatment and disposal *(e.g. total amount of waste generated, total amount of hazardous waste generated, composition of waste, treatment of hazardous/non-hazardous waste etc.)*	○ Not present ☒ Present Some domestic non-hazardous waste will be generated on the dam wall site and on the hydro power station and will be sent to the new domestic waste disposal site in Devin. Waste disposal is done with the help of a biological pre-treatment of waste. Furthermore a new domestic waste disposal site in Devin is in the planning stage. Environmental effect: ____Non-hazadous waste_____ Mitigation measures: ____EIA _____ o Compliance with relevant regulations/national technological standards o Relevant regulation: o Environment Act (State Gazette No.86/1991; No.85/1997; No.26/2001); o Restriction of Harmful Waste Impact on the Environment Act (State Gazette No.86/1997); o Regulation for requirements for treatment and transportation of residual oil and waste oil products (SG 59/2000); o Regulation for requirements for treatment and transportation of industrial and hazardous waste *(Please indicate where and how it is available.)* o National technological practice/standard: _____ *(Please state references.)* Does the project go beyond these minimum requirements? o No o **Yes:** The Vacha Cascade JI project applies reliable International, Austrian, German, European and US codes and standards. Moreover, the project is in compliance with all relevant EU regulations and directives concerning the environment, therefore it goes beyond the Bulgarian environment legislation requirements.
	☒ Positive effects*:* _New domestic waste disposal site Devin is in planning stage.

B 3 SOCIO-ECONOMIC AND DEVELOPMENT ASPECTS

The Austrian JI/CDM Programme touches on developing country interests, therefore the Austrian Development Cooperation Act, BGBl. 2002/49 idgF is also applicable to this Programme. The goals of the Austrian development cooperation policy are: poverty eradication, peace and human security, as well as environmental protection and sustainable use of natural resources. These goals lead to the following questions within the Austrian JI/CDM Programme.

The sections which apply to CDM projects only resp. to JI and CDM projects are marked accordingly.

B 3.1 Poverty eradication	
CDM project How and how much does the project contribute to economic growth in the host country? *Please provide estimated figures of the added value of the project and the current GDP of the host country.*	
CDM project Does any possible competition between the project and the productive sector in the host country exist? Do subsidies for the project hamper the competitiveness of the host country?	
JI and CDM project Creation of new jobs by the project	☒ Number of highly qualified jobs: 30 Operating phase: Tsankov Kamak power station: Management (higher qualification): 5 Technical staff (middle qualification): 20 Dam wall and reservoir: Technical staff (middle qualification): 5 **Total operating phase: 30** ☒ Number of low qualified jobs: **Total operating phase: 10** **Total construction phase: 500-600** The construction of the Vacha Cascade project will have a significant social effect for

	the Devin municipality. Currently, the municipality suffers of high unemployment rate among the active population – official and hidden. For the last 10 years Devin municipality has one of the highest percentage of unemployed population in the country and lacks jobs for employment of the young people. During the civil works of the Vacha Cascade project 500-600 jobs will be created. About 40 jobs at the operation phase will help to improve the living standard of the population and its permanent involvement in business related to the development of the town of Devin and its municipality, such as a balneological and tourist center, an area for health recreation and sports (both in the mountain and around the dam lake). The implementation of the Project will result in development and improvement of the road network within the sector Mihalkovo – Devin (Road III–868 liable to redesign); Mihalkovo – Stomanevo (the new bridge). No doubt, employment of the active population (the majority of them young people) will change the cultural life in Devin for the better. Construction phase job creation: 500 – 600 Operating phase - lower qualification Tsankov Kamak power station: subsidiary staff 2 security staff: 5 Dam wall and reservoir: Subsidiary staff: 3
CDM project Is the host country an Austrian targeted country resp. an Austrian cooperation country?[3] Does the host country belong to the LDCs?	

[3] Cp. e.g. http://www.bmaa.gv.at/view.php3?f_id=1463&LNG=en&version.

B 3.2 Peace, security, democracy	
CDM project What is the ranking of the host country in the human rights reports and in international corruption rankings? *Please refer to www.amnesty.org and www.transparency.org.*	
CDM project Is the host country involved in an internal or cross-border armed conflict?	

B 3.3 Social Situation, Cultural Awareness	
CDM project Does the project limit physical or de facto access by indigenous or local users to natural resources (e.g. water)?	
CDM project How will possible negative socio-economic or cultural effects (resettlement, access to resources, conflict user-groups etc.) be healed?	
JI and CDM project Social security of workforce *Description of services in comparison to local standards (health insurance, accident insurance, other social services)*	☒ health insurance please describe what will be covered by health insurance: The Health Insurance Act governs the statutory heath insurance that warrants free access for insured persons to medical services by way of a package of health services defined in terms of type, scope and volume as well as a free right of option of a medical person having a contract with a regional health insurance fund. The health insurance contributions of the insured individuals are specified in the Act on the National Health Insurance Fund Budget and their amount for 2003 is 6%. The contribution is paid by the Employer and the insured in the following proportion: • 75:25 – for the period 2002-2004. ☒ accident insurance please describe what will be covered by accident insurance: Article 12, paragraph 7, Item 3 of the Act on the State Social Security Budget establishes that for 2003 the security contribution to the Industrial Accident and Occupational Disease Fund shall be fully payable by Employers. The security contributions for employees are payable on the received gross monthly remunerations, but on not less than the minimum insurable income and no more than

	the maximum monthly amount of the insurable income during a calendar year. The security contributions for employees are allocated between the insurer and the insured as follows: • 75:25 – for the period 2002-2004. ☒ other social services …Act on State Social Security Budget: Pursuant to Article 124 of the Labor Code: The Employer is obliged to provide conditions for the employee to enable him/her to perform his/her job for which he/she has been employed, and pay him/her a remuneration for his/her work performed. The Employer shall within the times prescribed pay to the Employee the agreed labor remuneration wage (Art. 128 of the Labor Code) and insure him/her for all insurance social risks (Art. 129 of the Labor Code) in accordance with the provisions and the procedure prescribed in a separate act, being the Act on the State Social Security Budget. Statutory insured for all insured social risks pursuant to the Code of Statutory Social Security (CSSS) Art.4(1) are employees engaged for more than 5 business days or 40 hours during a calendar month irrespective of the nature of work or services, method of payment and the source of financing. The insurance social risks are the subject of the Social Security Code. Article 1 of the Code regulates the public relations in respect of: 1. state social security in the event of general disease, industrial accident, occupational disease, maternity, unemployment, old age and death; 2. additional social security that includes: a. additional statutory pension insurance for old age and death; b. additional voluntary pension insurance for old age, disability, and death; c. additional voluntary insurance for unemployment and/or professional qualification. For the statutory social security to be provided by the Employer for all insurance social risks, the State Social Security grants compensations, benefits and pensions for: 1. temporary incapacity; 2. temporary diminished capacity to work; 3. disability; 4. maternity; 5. unemployment; 6. old age; 7. death. Article 11 of the Act on the State Social Security Budget specifies for 2003 the following amounts of security contributions according to the covered insurance social risks: For individuals insured against all social risks: 36.7% for people working under the Labor Category III conditions. The amounts of security contributions for 2003 are allocated to the state social security funds and additional statutory pension fund as follows: • in the case of the Pension Fund: - 29% for persons born before 1 January 1960; - 27% for persons born after 31 December 1959; • 3% for the General Disease and Maternity Fund ; • 0.7% in the case of the Industrial Accident and Occupational Disease Fund; • 4% in the case of the Unemployment Fund ; • 2% in the case of the additional statutory pension insurance with a universal pension fund for persons born after 31 December 1959.

	Sanitary facilities for the employees: **Bulgarian Labor Code** The Labor Code regulates the labor relations between employees and employers and any other relationships directly associated thereto. Within his responsibilities to ensure appropriate conditions of work as required under Article 127(1), Item 3, the Employer is obliged to establish health and safe conditions of work. **Health and Safe Conditions of Work Act** This Act regulates the rights and obligations of the State, Employers, Workers and Employees, self-employed persons or person working under partnership arrangements, other entities and legal persons in relation to the provision of health and safe conditions of work. This Act is applicable to all undertakings and establishments where work is performed or training is conducted irrespective of the form of organization, type of ownership or the grounds on which the work or training takes place unless otherwise specified in another act or international agreement the Republic of Bulgaria is a party thereto. The provision of health and safe conditions of work is subject to the specific nature of the work performed and the requirements for technical, technological and social development in order to protect the life, health and working capacity of employees. The health and safe conditions of work at sites, production lines, processes, activities, working places and at operating equipment are ensured through the design, construction, refurbishment, upgrading, commissioning and operation of such sites, production lines, processes, activities, working places and operating equipment including their maintenance, repair and decommissioning. Any and all designers and developers of construction sites and activities, production lines, structures, technologies and operating equipment are required to make the relevant design in conformance with all rules and standards regulating the health and safe conditions of work. In the process of design, construction and commissioning of projects the investor is responsible for and will demand, and the relevant control authorities will oversee compliance on the part of the designer or contractor with the rules and standards for health and safe conditions of work. Commissioning of new, refurbished or upgraded projects is authorized only if there is evidence of proven compliance with the requirements for health and safe conditions of work. The work places must comply with the minimum requirements of providing health and safe conditions of work and they are established by Regulation of the Minister of Labor and Social Policy and the Minister of Health. **Regulation No.3/19.04.2001 on the Minimum Requirements for Workers' Safety and Health Protection in Using Personal Protective Equipment at the Work Place** This Regulation sets forth the minimum requirements for workers' safety and health protection in the cases when personal protective equipment is used. This Regulation is applicable to all undertakings and establishments where work is performed. Personal protective equipment is used when risks cannot be avoided or diminished to a sufficient extent by means of collective protection or by measures, methods and procedures employed in the organization of work. If the work to be performed involves risks for the health and safety that cannot be avoided otherwise, the Employer shall provide the employees with appropriate personal protective equipment that must comply with the standards and requirements for safety and health protection contained in the personal protective equipment-related regulations assessing the compliance of such articles and governing their free movement on the market.

	Regulation on the Free of Charge Work Clothing and Uniforms The work clothing is provided to workers where the conditions of work require such protective outfit. The management boards of companies shall issue lists of employees classified by job positions and trades who have the right of receiving free of charge work clothing including specification of the type, model, material, color, identification marks/badges and wear out terms. The work clothing is listed as inventory of the enterprise and accounted for as inventory articles and materials of short wear and low value. The work clothing shall be provided to an employee no later than 3 days of his effective employment. This Regulation is issued on the grounds of Article 296 of the Labor Code. The cost of work clothing and uniforms is not taxable on the overall income. **Regulation No. 8/24.04.1987 on the Free of Charge Special Food to be provided to Workers Employed in Production Lines with Harmful Effects to Health** This Regulation prescribes the type and amount of free of charge special food, antitoxins or health protective food and other aids provided to workers employed in production lines involving harmful implications to health. The Regulation defines 5 preventive diets. The Regulation forbids replacement of health preventive food by money or other food-stuffs. The Regulation provides a list of occupational factors whereupon workers are entitled to enjoy preventive diets, and a list of production lines where workers shall receive vitamins. **Regulation No.7/23.09.1999 on the Minimum Requirements for Health and Safe Conditions of Work at Work Places and in the use of Operating Equipment** This Regulation defines the minimum requirements for health and safe conditions of work at every work place and in the use of operating equipment. The Regulation is applicable to all enterprises and establishments where work is performed in accordance with the Health and Safe Conditions of Work Act. The Employer shall procure application of the provisions of the Regulation as to work places, work processes and in the use of operating tools and equipment. This Regulation sets forth, for the stage of design and construction, the selection procedure for building sites for factories, buildings, facilities, etc. that should be in accordance with the activity to be performed thereon including compliance with the standards and requirements for the protection of workers and population. Buildings and facilities of production purpose shall be placed on the factory site in such way so as to minimize any adverse impacts. The Regulation sets forth the requirements to production buildings, work halls and work places in relation to the provision of safe and health conditions of work. The Regulation contains provisions for the working environment. It specifies lighting conditions and the microclimate at the work places as well as requirements as to dust, toxic and other hazardous substances in the working environment. The Regulation contains requirements as to ventilation conditions, noise and production vibrations at work places. Regarding the use of operating tools and equipment, the Regulations provides that: - the operating tools and equipment, technologies and materials must comply with the standards and requirements for safety and protection of health at work, fire protection and with the requirements contained in the rules and regulations applicable to such equipment relating to the assessment of compliance; - the supporting documentation must be in the Bulgarian language containing all necessary data and requirements relating to their safe operation, maintenance and repair. The Regulation contains provisions as to: - organization of work;

	- water supply and sewage systems; - fire fighting; - sanitary and accommodation conditions; - provision of personal protective equipment and special work clothing; - emergency procedures. **Regulation No.3/18.09.2002 on the Minimum Requirements for Health and Safe Conditions of Work at Work Places with Video Displays** This Regulation specifies the minimum requirements for health and safe conditions of work at places equipped with video displays. The employer shall assign to labor medicine experts to study the work places equipped with video displays in order to identify all possible situations and actions that may cause damage especially to eyes and locomotory system, stress, etc. The employer shall in accordance with the results of the above analysis undertake measures to eliminate any harmful risks established. An Appendix to the Regulation specifies the requirements to be met by work places using video displays. The employer shall organize the work of persons using video displays in such way so as to allow for periodic breaks. The employer shall undertake measures to protect the eyes of persons working with video displays by arranging for medical examinations by eye-specialists and providing at his cost glasses, if applicable. **Regulation No. 3/27.07.1998 on the Functions and Tasks of Officers and Specialized Units at Enterprises in charge of setting up the implementation of activities relating to protection against and prevention of occupational risks** This Regulation prescribes the functions and tasks of the health and safety bodies at enterprises. Such bodies shall assist the employer in performing his obligations of ensuring safe and health conditions of work. The employer shall direct and supervise directly such bodies. The **Environmental Impact Assessment** recommends a number of measures to mitigate negative impacts for the employees during the construction and implementation phases. The following precautions have to be taken in the process of work at above-ground construction sites: • Personal protection means shall be used to mitigate the adverse effect of local vibrations. • In connection with the overheating and overcooling conditions, adequate work clothes, sufficient drinks in summer and hot drinks in winter shall be provided for bulldozer and excavator operators as well as of other laborers working in the open air ground. • In order to mitigate the harmful effect of general and local vibrations on bulldozer, crane and excavator operators in the course of intensive work, at least two regular 20-minute breaks per working day shall be provided in addition to the lunch break. In the event that there are waiting periods within the shift and the average exposure per shift does not exceed 4 hours, such breaks are not recommended. The following precautions shall be taken in the process of work at underground construction sites: • In order to mitigate the harmful effect of dust, the workers shall wear dust masks. • In order to mitigate the harmful effect of noise the workers shall wear ear muffs. • Work clothes suited to the season shall be provided.

	With respect to the population of the adjacent territories: • In order to limit the maximum noise levels, the maximum speed of the heavy-duty trucks within settlements shall be limited to 40 km/h. • If feasible, the "station node" construction site shall be situated in a more remote place. If that is impossible, the work shall be managed in such a way that the working day shall not begin before 6.00 a.m. and shall not end later than 10.00 p.m. Detailed Information: EIA, pages 106-109 and chapter III.G Annex 7: Republic of Bulgaria, Ministry of Environmental: Decision on Environmental Impact Assessment

B 3.4 Gender Equality	
JI and CDM project Equal Opportunities *Are the principles of equal opportunities reflected in the employment structure of middle and upper management?*	Principles of equal opportunities are reflected in the NEK employment structure. *Middle Management* Number of women: 12 Number of men: 36 Middle Management NEK EAD: Heads of Divisions and Heads of Departments *Upper Management* Number of women: 2 Number of men: 4 Higher Management of NEK EAD: Board of Directors and Procurator

B 4 ADDITIONALITY AND SUSTAINABILITY

B 4.1 Additionality	
Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances *In addition please provide the total estimate of anticipated reductions in tonnes of CO_2 equivalent.* *(EB PDD A.4.4.)*	Taking into consideration that the planned HEPP Tsankov Kamak will generate more than 90% of electricity production of the Vacha Cascade JI Project it is obvious that Tsankov Kamak represents from a financial point of view the biggest and crucial part of Vacha Cascade JI Project. More than 20 years ago NEK started looking for a financial set up for the Tsankov Kamak Project. Many attempts have been made so far to set up a financing scheme for the project, but no attempt was successful so far. In connection with the Vacha Cascade JI Project, from the very beginning it was the demand from NEK that in addition to the supplies and services from Austrian side, a financing package covering the entire Project has to be provided. Therefore, VA TECH FINANCE took over the role as an arranger for 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 4 years construction period in addition to the very long credit repayment period of 12 years (requested by the client for HPP Tsankov Kamak) it became clear that without the involvement of ECAs the financial set-up will not be bankable. Nevertheless, at this time the cover policy of Austrian Export Promotion Authority (OeKB) for the country Bulgaria only allowed a maximum covered credit of MEUR 5 with a maximum repayment period of 5 years based on a first class Bulgarian bank guarantee or a State Guarantee. Only in February 2002, OeKB doubled its limits to MEUR 10 and 10 years. Compared to the estimated total project cost of the Tsankov Kamak project of MEUR 170, the maximum amount to be covered by OeKB was by far not sufficient. Besides that a State Guarantee could not be offered by NEK due to restrictions of IMF towards the Bulgarian Ministry of Finance to issue State Guarantees (Currency Board regulations). A MEUR 10 ECA covered loan compared to MEUR 160 commercial loans would have resulted in a sweet-sour ratio not acceptable to any bank. 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. So, the financing process was blocked by limited ECA cover facilities (it should also be mentioned that so far only OeKB accepted NEK as clean corporate risk, no other ECA has ever accepted NEK risk). Furthermore, an IFI approach was considered not

	appropriate and an inner Bulgarian financing was definitively impossible, in particular due to the requested long tenor and the high amount of the loan. It became obvious that Emission Reduction Units (ERUs) could play a substantial role in the transaction when the bilateral Memorandum of Understanding between the Bulgarian Ministry of Environment and Water and the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management was signed on Sept. 2nd, 2002 and ratified thereafter by Bulgarian Parliament. Based on this, the Austrian Ministry of Finance and OeKB declared their preparedness for a tremendously higher cover amounting to MEUR 100 (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 was prepared to grant such a high guarantee, which represents 10 times its previous maximum cover policy for Bulgaria. Therefore, the JI approach considered as a pre-condition for the realization of the Tsankov Kamak project. At this moment, the sweet-sour ratio between ECA covered and uncovered portions became bankable and the response from international banking community on the financial set-up was positive. It was 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 was from now on an essential collateral for the whole project set-up and, therefore, serves as a crucial leverage for the entire realization of Vacha Cascade JI Project. Actually, the financing structure foresees an approx. MEUR 100 ECA covered credit facility, an approx. MEUR 25.5 down payment financing, an approx. MEUR 44.5 commercial loan for civil works and, finally, a MEUR 30 facility for financing of the road construction (based on the project information prevailing so far). So the JI set-up was first of all the go-decision from ECA point of view. When a substantial ECA involvement could be expected, the JI set-up was the attractiveness 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 Tsankov Kamak Project would be unrealistic. When the discussions about the JI potential of Tsankov Kamak started, NEK EAD explored the possibilities of increasing the output of existing power plants in the Vacha cascade. Due to the unfavorable relation between investment costs for renewing the mechanical/electrical parts and the increase in capacity and output, the rehabilitation projects did not have a high priority in the investment plan of NEK EAD. Therefore, the refurbishment projects – which generate only some 5% of the entire emission reduction – were included in the plans to form the Vacha Cascade Joint Implementation Project. As the preliminary talks with the ministries were that encouraging, NEK EAD was convinced that the entire project would qualify as a Joint Implementation project. Therefore development of the refurbishment projects has been continued. Due to the much smaller amounts of rehabilitation of HEPP Devin and HEPP Teshel, each around MEUR 4, financing could be arranged by VA TECH FINANCE Ireland Ltd with OeKB cover. HEPP Orfeus & Krichim (MEUR 14) was financed by Société Générale with a cover from OeKB – each with an ECA covered repayment period of only 5 years. **Total estimation of emission reduction:** 2008-2012: 1,140,000 t CO_2 e 2004-2007: 45,960 t CO_2 e Calculation details are shown in the Baseline Study.

B 4.2 Sustainability	
Description of the project's contribution to the sustainable development of the host country *Please describe the view of the project participants of the contribution of the project activity to sustainable development.* *(EB PDD A.2.)* *This section should also include a description on how environmentally safe and sound technology and know-how to be used is transferred to the host Party, if any. What kind of project specific training is planned? Which maintenance measures are planned?* *(EB PDD A.4.3.)*	Bulgaria is strongly dependent on energy imports, more than 70% of its primary energy resources are coming from abroad. The only important domestic energy resource is low quality lignite coal with a high content of sulfur. The energy generation relies mainly upon imported fuels – oil, natural gas, good quality coal and nuclear fuel – prevailing from one supplier (Russia). Decreasing the energy dependence the Bulgarian 'Concept Paper on the National Energy Strategy' identifies two main directions: - Decrease in energy intensity (energy consumption per GDP unit) in the economy. The new vision in this direction is aimed at overcoming the inertness and taking active steps to achieve higher efficiency with respect to all processes of energy supply (i.e. generation, transmission, distribution, demand). - Use of domestic renewable energy resources. The renewable energy sources are another local resource that can reduce the dependence on import, improve security of supply, facilitate environmental compliance and contribute to a higher employment rate. The Vacha Cascade Joint Implementation Project will contribute to Bulgaria's efforts towards decreasing the energy dependency and achieving sustainable development by using domestic renewable energy resources. All equipment to be utilized in the Vacha Cascade is proven state-of-the-art technology. The technology transfer will be realized by the internationally reputable Austrian supplier group. Please find attached the Scope of the obligatory pre-repair and post-repair tests of the HPP equipment before and after general repair: Chapter III.O Annex 15: Obligatory Tests of HPP Equipment.

C Stakeholder Comments

Stakeholders include all Parties or persons affected by the project. If several stakeholder comments are made, the table is to be copied and filled in separately for each stakeholder.

In the case of CDM projects stakeholder involvement is mandatory (also on an international level).

C 1 Identity of stakeholders	
Name	The following section describes the rules of procedure of the Environmental Impact Assessment and the integration of stakeholders. Formal communication, official decisions and public invitations are listed in chapter III.N Annex 14: EIA List of Enclosures 1 - 11.
Type of organization	☒ Authorities: _Community, Ministry_____ ☒ Private Enterprise ☒ NGO ☒ Individual Person ○ Other: _____
Description of the effects of the project on the stakeholder	See chapter III.N Annex 14: EIA List of Enclosures 1 - 11
Address	See below
Phone/fax	See below
E-mail	See below
Contact person	Please see chapter Annex 14: EIA List of Enclosures 1 - 11; Enclosure No. 8.
Brief description of the process on how comments by (local) stakeholders have been invited and compiled *(EB PDD G.1.)*	The environmental impact assessment procedure for Tsankov Kamak Hydro-Power Project was fulfilled in compliance with the provisions and regulations of the Bulgarian Law – Environmental Protection Act (State Gazette, Issue 86, dated 1991), Decree No. 4, dated July 7, 1998, about Environmental Impact Assessment (Enclosure No. 1) and the other legal documents and norms relevant to the EIA. The procedure for preparation of environmental impact assessment included the following three stages: a) Preliminary report on the environmental impact assessment, prepared by a team of licensed experts; Public discussions; Resolution by the competent body – the Ministry of Environment and Waters (MOEW). **Stage 1 – Preliminary Report on the Environmental Impact Assessment, Prepared by a Team of Registered Experts:** The report on the environmental impact assessment was prepared at the stage of pre-design studies under the project, systemized in a Summary Report in two volumes, dated February 2001. It should be noted that the pre-design studies under the project were performed during a long period of time and therefore they include investigation of various schemes for construction at the Vucha River section, different types of dams and different options regarding the capacity of the future hydro power station. All this

	provides very detailed information regarding the determination of the technical and economic parameters of the project and therefore ensures as minimum impact on the environment as possible. In September – October 2001, pursuant to the Regulation about Award of Public Orders below the limits, specified in Article 7, Item 1 of the Law for Public Orders, a procedure for selection of a team of licensed expert to be assigned the preparation of the preliminary report took place. In accordance with the technical specifications, during the preparation of the report the following main issues were reviewed: General information – investment project designation; investor's data – seat and unified identification number of the legal entity, contact person; indication of physical and juridical persons that could be affected by the execution of the investment project; location – map or sketch and description of the area; legal and institutional frame; information provisions. Project annotation – alternatives for: location, engineering solutions, technologies; project characteristics: flow chart, main resources and materials, natural resources and power sources (types, quantity, reserves and resources; annual consumption), total areas required (decares, agricultural or forest land, category, stages of appropriation; proximity to protected areas), social effect (employment, social need, social benefits), hazardous work places, provision of healthy and safe working conditions; project execution: construction, commissioning, operation, changes in the project (development, stages, completion, others), interrelation with the technical infrastructure of the area (including ancillary activities). Analysis of the existing conditions, prognosis and assessment of the anticipated impact on the environmental components expected to be affected by the investment project execution – atmospheric air; surface and underground waters; wastes; dangerous substances; deleterious physical factors: noise, vibrations and harmful radiation (ionizing, non-ionizing, thermal, etc.), microclimate, high atmospheric pressure, etc.; lands and soils; bowels of the earth; animal world and vegetable kingdom, protected natural areas; landscape; cultural heritage. The methods approved by the Ministry of Environment and Waters shall be applied to prognosticate the expected impact on the environmental components and factors. Health and hygienic environmental aspects: analysis of the existing conditions and prognosis of anticipated impact on people's health and public health conditions of the environment, expected to be affected by the project execution. List of methods, used for assessment and prognosis of the environmental impacts with reference to the source of publication. Possible ways to achieve the purposes of the project. Measures to mitigate the negative consequences: identification of the actions that have to be foreseen, developed or completed deemed as conditions for project permission. Estimate of action plans for emergency situations and broadside pollution. Self-monitoring plan prepared in compliance with the environmental regulations; if necessary, arrangement of environmental monitoring in specific points for the purposes of confining and preventing the harmful effect on human health and environment. Conclusion including recommendations by the EIA's authors regarding the limiting parameters that will have to be observed during the subsequent stage of engineering in compliance with the active norms and standards about admissible environment pollution. In order to provide unambiguous answer to the above issues, the experts traveled over the terrain, performed seasonal terrain observations held consultations with representatives of the local administration on whose territory the project will be realized. The preliminary report was prepared and submitted to NEK EAD, Hydroelectroinvest Branch on January 23, 2002. After being reviewed and studied in detail, the report was submitted to the Ministry of Environment and Waters, with letter No. Kv-01-226 dated 03.04.2002 (Enclosure No. 1), for opening a procedure for public discussions and taking of decision.

	Stage 2 – Public Discussions: The public discussion procedure regarding the environmental impact assessment for Tsankov Kamak Hydro Power Project was opened with letter No. OVOS-6182 dated 28.06.2002, issued by the Minister of Environment and Waters (Enclosure No. 2). MOEW's announcement about the opening of the procedure was published in Otzvuk newspaper, Smolyan town, in its issue dated 27.06.2002 (Enclosure No. 3) and in Sega newspaper – a national daily, in its issue dated 28.06.2002 (Enclosure No. 4). The Municipal administration of Devin town was informed about the announcement with letter No. Kv-01-368 dated 28.06.2002, accompanied with materials related to the public discussions (Enclosure No. 5). The date and the place of the public discussions were notified to: the leader of the preliminary report team – with letter No. Kv-01-388 dated 09.07.2002; the designer – with letter No. Kv-01-390 dated 10.07.2002 (Enclosure Nos. 6 and 7). The public discussions took place on 31.07.2002 in the administration building of Devin Municipality. A representative of the body, authorized to issue a resolution on EIA, i. e. MOEW, was a chairman of the discussions. The discussions were attended by representatives of: MOEW; the Employer NEK-EAD, Hydroelectroinvest Branch; the licensed experts team that has prepared the EIA report; the designer Energoproekt-Hydro Power OOD; Devin Municipal Administration; the deputy-mayor of Stomanovo village; private proprietors, affected by the construction; Sanitary Inspectorate – Smolyan town; Vucha OOD, Devin town – a refuse collection company; socially active persons; citizens, etc. The attendees' standpoints, expressed at the discussions, were recorded in the Minutes as of the same date, including a list of names enclosed to it (Enclosure No. 8). After the public discussions were held, the legal 14-day period for submission to the Municipality of written appeals, standpoints, opinions, recommendations and objections on the EIA report was granted. None of the above was presented. **Stage 3 – Issuance of Resolution by the Authorized Body – the Ministry of Environment and Waters.** A meeting of the Superior Expert Ecological Council to MOEW was held on 10.10.2002 in order to take a decision about the preliminary report on the environmental impact assessment for Tsankov Kamak Hydro Power Project – Order No. RD-870 dated 23.09.2002 (Enclosure No. 10). Chairman of the meeting was Mr. Kr. Dukov – Deputy Minister of MOEW. After the report presentation, the meeting reviewed a draft resolution on EIA. The resolution, issued by MOEW, on Environmental Impact Assessment No. 36-16/2002 for Tsankov Kamak Hydro Power Project was notified in writing to NEK-EAD, Hydroelectroinvest Branch, with letter No. 91-00-5931 dated 24.10.2002 issued by MOEW (Enclosures No. 10 and 11). Pursuant to the Bulgarian legislation, after the issuance of resolution on the EIA for the project, NEK-EAD may proceed with filing of documentation for issuance of construction permit. **Enclosure No. 1:** Letter No. Kv-01-226/03.04.2002, issued by NEK-EAD, Hydroelectroinvest Branch, about submittal of the report to MOEW. **Enclosure No. 2:** Letter No. OVOS-6182/28.06.2002 by the Minister of Environment and Waters about opening of public discussions procedure. **Enclosure No. 3:** MOEW's announcement about the procedure opening, published in Otzvuk newspaper, Smolyan town, issue dated 27.06.2002. **Enclosure No. 4:** MOEW's announcement about the procedure opening, published in Sega newspaper – national daily, issue dated 28.06.2002 **Enclosure No. 5:** Letter No. Kv-01-368/28.06.2002 issued by NEK-EAD, Hydroelectroinvest Branch to Devin Municipality Administration regarding published announcements and submitted materials for public discussions. **Enclosure No. 6:** Letter No. Kv-01-388/09.07.2002 issued by NEK-EAD, Hydroelectroinvest Branch to the leader of the team, responsible for the preparation of EIA's report, about the date and place of the public discussions.

	Enclosure No. 7: Letter No. Kv-01-390/10.07.2002 issued by NEK-EAD, Hydroelectroinvest Branch to the designer, about the date and place of the public discussions. **Enclosure No. 8:** Minutes of the public discussions, held on 31.07.2002 in Devin town, with enclosed list of attendees. **Enclosure No. 9:** Order No. RD-870/23.09.2002 by the Minister of Environment and Waters setting the time of a meeting of the Superior Expert Ecological Council to MOEW. **Enclosure No. 10:** Resolution of MOEW on EIA No. 36-16/2002 for Tsankov Kamak Hydro Power Project. **Enclosure No. 11:** Letter No. 91-00-5931/24.10.2002 of MOEW to NEK-EAD, Hydroelectroinvest Branch, notifying the resolution on the environmental impact assessment. All enclosed documents describe in detail the procedure for preparation of environmental impact assessment. The documents are kept in the archives of NEK-EAD, Hydroelectroinvest Branch, Belovo town. The original of the Minutes of the Public Discussions, held in Devin town on 31.07.2002 is kept in MOEW's archive. All Enclosures are listed in chapter III.N Annex 14: EIA List of Enclosures 1 - 11.

C 1 Identity of stakeholders	
Name	**Community of Devin**
Type of organization	☒ Authorities: __Municipality_____ ○ Private Enterprise ○ NGO ○ Individual Person ○ Other: _____
Description of the effects of the project on the stakeholder	The Community of Devin is situated on an area of 575 km2 in the southwest part of the Rhodopes Mountains along the following rivers: Devinska, Shirokolashka, Trigradska and Vacha. It borders with the following communities: Smolian, Borino, Batak, Perushtitsa and Chepelare and the Republic of Greece. As of 01.01.2002 the population of the Devin Community amounted to 15054 people, 7425 out of which n Devin and the remaining 7629 people living in the fifteen villages belonging to the Community. Because of its location in a mountainous region, the Community of Devin has been most strongly affected by the economic crisis that resulted from the structural reforms after 1990 and the transition to a market economy. A great drop of the economy has been observed here. Our Community faces a very heavy financial situation and cannot by itself solve the social problems related to the population. The unemployment rate has been showing a continuous increase during the recent years. That is the reason why the construction of Tsankov Kamak Hydro Power Project has been among the priority tasks included in the strategy of the Devin Community in order to decrease the unemployment and create new jobs in the region.
Address	BG-4800 Devin Devin City Hall
Phone/fax	
E-mail	
Contact person	Mr. Yulian Semchev Mayer, Community of Devin

C 2 Stakeholder comments	
Brief description of the process on how comments by (local)	The project was presented to stakeholders for several times. Transparency of the process and co-ordination between the different sectors involved - government,

stakeholders have been invited and compiled *(EB PDD G.1.)*	developer and community - has been assured. Neither objections nor proposals for major design modifications of the power plant and dam were raised verbally or handed in writing. The people in the region have a very positive attitude to the project. Based on Bulgarian requirements the preparation of the Environmental Impact Assessment report was done by an independent team of experts. The studies were published and there was a public discussion about the contents including all relevant stakeholders.
Summary of the stakeholder comments received *(EB PDD G.2.)*	The following section summarizes the comments of Mr. Yulian Smchev, mayor of the community of Devin, on the Tsankov Kamak project. Based on the results of the public discussion on the Environmental Impact Assessment the Community of Devin will support all initiatives which results in the implementation of the Tsankov Kamak Hydro Power Project. The main arguments are listed below: • The Tsankov Kamak Project is environmental friendly, no agricultural lands, monuments of historical value or settlements will be flooded. • The mitigation and depopulation process will be decreased. • Construction of the new road Devin – Mihalkovo, which will considerably improve local infrastructure. • Direct and indirect job creation during the construction and operation of the Tsankov Kamak project. • The project creates some local activities related to the supply of building materials, transport and construction equipment. • Further positive social and economic impacts of the Tsankov Kamak Project. The stakeholder comments of the Municipality of Devin can be found in chapter III.J Annex 10: Stakeholder Comments, Municipally Devin.
Report on how due account was taken of any comments received *(EB PDD G.3.)*	NEK EAD will take the comments into account and will maintain the permanent exchange of views between the project developer and the stakeholders.

D Baseline

A JI or CDM project should result in additional emission reductions, this means such emission reductions which would have not taken place without these projects. To be able to prove such emission reductions it is essential to calculate the emissions

- in the project scenario and
- in the baseline scenario.

The actually achieved emission reductions result from the difference between the two scenarios.

Emission Reductions = (Baseline Emissions) — (Project Emissions)

D 1 BASELINE DEVELOPMENT

D 1.1 Details of baseline development	
Name and address of person/entity determining the baseline *Please provide contact information and indicate if the person/entity is also a project participant.* *(EB PDD B.6.2.)*	The Baseline Study for the Vacha Cascade JI Project has been prepared in a separate document. The following sections summarize the results of this baseline study. **KWI Management, Consultants & Auditors GmbH** Burggasse 116 A-1070 Wien Manfred Stockmayer ms@kwi.at Gerald Dunkel dg@kwi.at
Date of completing the final draft of this baseline section (DD/MM/YYYY) *(EB PDD B.6.1.)*	12 September 2003

The project can be split into various project components. This serves the definition of the project boundary and the choice of the baseline methodology. For details see e.g. the baseline study available at http://www.ji-cdm-austria.at or http://www.klimaschutzprojekte.at.

D 1.2 Project components	
Project components	○ E (0) ☒ E (+ -) ○ H (0) ○ H (+ -) ○ M (-)

The project boundary defines which emissions in which framework must be considered in the emission calculation. The project boundary must include all significant emissions which are subject to the project operator's direct control and can be allocated to the project. For details see e.g. the baseline study available at http://www.ji-cdm-austria.at or http://www.klimaschutzprojekte.at.

D 1.3 Project boundary	
Description of how the definition of the project boundary related to the baseline methodology is applied to the project activity *(EB PDD B.5.)* *Please enclose a graphical representation of the project boundary.*	The project boundary is defined in terms of the system impacted by the operation of the proposed Vacha Cascade JI project. Generation of the project will be feed into the Bulgarian national EPS. The Baseline Study has not found leakage to be a problem for the project. Therefore the Monitoring Plan does not correct the emission reductions to account for leakage. The Bulgarian Electric Power System: Chapter III.M Annex 13: Bulgarian EPS.
Substantiation of the selected project boundary	The Vacha Cascade JI project will be connected to the Bulgarian public electricity grid. Its operation will therefore directly affect the generation plants connected to the grid by displacing those that have the highest marginal costs. Details are described in the Vacha Cascade Baseline Study.

Influencing factors can affect both the project scenario and the baseline scenario. Factors relevant for the project and their possible effects are to be stated. Examples are the energy policy of the host country, raw material prices etc. For details see e.g. the baseline study available at http://www.ji-cdm-austria.at or http://www.klimaschutzprojekte.at.

D 1.4 Influencing factors	
Legal influencing factors	Type of influencing factor Factor A: _____ Accession to the EU_____ Factor B: _____ Decommissioning of NPP Kozloduy Units 3+4 Relevance for the project Factor A: _____ Refurbishment program of thermal power plants, adoption of the European legislation Factor B: _____ Significant change of available capacities Expected development Factor A: _____ Accession by 2007 Factor B: _____ Decommissioning is planned by the end of 2006, dependent on negotiations with the EU
Economic and political influencing factors	Type of influencing factor Factor A: _____ Electricity demand Factor B: _____ Relevance for the project Factor A: _____ Basis for marginal plants Factor B: _____ Expected development Factor A: _____ Maximum Scenario 2003-2012: +17.4% Factor B: _____

Please extend the table if multiple factors play a role.

D 2 PROJECT SCENARIO

D 2.1 Project emissions within the project boundary	
Emissions within the project boundary	☒ Emission 1 Source: _____ Bulgarian EPS_____ Type of emission: _____CO_2 _____ ○ Emission 2 Source: _____ Type of emission: _____ ○ Emission 3 Source: _____ Type of emission: _____ ○ Emission 4 Source: _____ Type of Emission: _____
	○ No emissions within the project boundary

Leakage is (project-related) emissions occurring outside the project boundary. They are not under the direct influence of the project operator.

D 2.2 Leakage	
Leakage	○ Leakage 1 Source: _____ Type of leakage: _____ ○ Leakage 2 Source: _____ Type of leakage: _____
	☒ No leakage

To calculate the project emissions the following data must be collected for each emission source:

1 fuel input in tonnes,

2 specific emission factors.

The emissions are calculated by multiplying the fuel input by the corresponding emission factors. For details see e.g. the baseline study available at http://www.ji-cdm-austria.at or http://www.klimaschutzprojekte.at.

D 2.3 Calculation of project emissions within the project boundary *(EB PDD E.1., EB PDD E.6.)*	
Emission 1	2004-2007: 107,604 kt CO2 2008-2012: 140,013 kt CO2 Calculation is shown in the Baseline Study chapter 8 (Project scenario)
Emission 2	
Emission 3	
Emission 4	

Please include a description of the formulae used to estimate anthropogenic emissions by sources of greenhouse gases of the project activity within the project boundary (for each gas, source, formulae/algorithm, emissions in units of CO_2 equivalent).

D 2.4 Calculation of leakage emissions *(EB PDD E.2., EB PDD E.6.)*	
Leakage 1	
Leakage 2	

Please include a description of the formulae used to estimate leakage, defined as: the net change of anthropogenic emissions by sources of greenhouse gases which occurs outside the project boundary, and that is measurable and attributable to the project activity (for each gas, source, formulae/algorithm, emissions in units of CO_2 equivalent).

D 2.5 Calculation of total project activity emissions *(EB PDD E.3., EB PDD E.6.)*						
	Year 1	Year 2	Year 3	Year 4	Year...	$\sum$
Emissions (in t CO_2/year)						
Leakage (in t CO_2/year)						
Total emissions (in t CO_2/year)						

CO2 Emission Reduction		**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2004-2007**	**2008-2012**
Project CO2 Emissions	kt CO2/a	25,922	25,649	27,084	28,949	29,190	29,732	27,282	27,901	25,909	107,604	140,013

D 3 BASELINE SCENARIO

Baseline methodology refers to the methods used to determine the baseline emissions. The division of the project into various subcomponents could serve the selection of a baseline methodology. For details see e.g. the baseline study available at http://www.ji-cdm-austria.at or http://www.klimaschutzprojekte.at.

D 3.1 Baseline methodology	
Description of the selected methodology and justification of the choice of the methodology and why it is applicable to the project activity *(EB PDD B.2.)* *If an approved methodology is chosen, please indicate the title and reference of the methodology applied to the project activity.*[4] *(EB PDD B.1.)*	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 should show 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 would require 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 though 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 Vacha 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
Description of how the methodology is applied in the context of the project activity *(EB PDD B.3.)*	Using the IRP Manager Model.

[4] If a new baseline methodology shall be applied to a CDM project activity, a special procedure has to be observed. For details please refer to http://cdm.unfccc.int/.

Different scenarios can be used for each methodology.

D 3.2 Identification of different baseline scenarios	
Baseline Scenario 1	Minimum scenario regarding the electricity demand forecast.
Baseline Scenario 2	Maximum scenario regarding the electricity demand forecast.
Baseline Scenario 3	

Every suggested scenario has to be justified.

D 3.3 Selected baseline scenario	
Description of the selected baseline scenario and substantiation of the selection	The analysis of the future electricity demand shows that there is quite a difference in the additional electricity consumption in the 2 scenarios. While in the Minimum scenario there will be an increase in demand of about 3,900 GWh between 2003 and 2012, additional demand will be some 7,400 GWh in the Maximum scenario. 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, which scenario is used for the further analyses in this baseline study. As in the Minimum scenario the demand increase between 2003 and 2012 is only 9.2%, 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 is necessary to meet the demand. In the Maximum scenario on the contrary, demand will increase by 17.4% over the same period, 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 CO_2 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 CO_2 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 Vacha Cascade Project the marginal plant in each hour of the year will be analyzed based on the actual dispatch order. Therefore any change 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.

D 3.4 Baseline description	
Was a new baseline developed for the project?	☒ Yes ○ No
Was an existing baseline used or adapted for the project?	○ Yes: _____ (*State sources and matters used.)* ☒ No
Is it planned to update the baseline during the project lifetime?	○ Yes ☒ No No, in the Monitoring Plan for the Vacha Cascade JI Project the marginal plant will be analyzed based on the actual dispatch order. Therefore any change in real electricity demand will be taken into account in the Monitoring Plan.

D 3.5 Baseline emissions within the project boundary	
Emissions within the project boundary	☒ Emission 1 Source: _____ Bulgarian EPS_____ Type of emission: _____CO_2 _____ ○ Emission 2 Source: _____ Type of emission: _____ ○ Emission 3 Source: _____ Type of emission: _____ ○ Emission 4 Source: _____ Type of emission: _____
	○ No emissions within the project boundary

D 3.6 Leakage	
Leakage	○ Leakage 1 Source: _____ Type of leakage: _____ ○ Leakage 2 Source: _____ Type of leakage: _____
	☒ No leakage

To calculate the baseline emissions the following data must be collected for each emission source:

1 fuel input in tonnes,

2 specific emission factors.

The emissions are calculated by multiplying the fuel input by the corresponding emission factors. For details see e.g. the baseline study available at http://www.ji-cdm-austria.at or http://www.klimaschutzprojekte.at.

D 3.7 Calculation of baseline emissions *(EB PDD E.4., EB PDD E.6.)*	
Emission 1	2004-2007: 107,650 kt CO2 2008-2012: 141,153 kt CO2 Calculation is shown in the Baseline Study chapter 7 (Baseline scenario)
Emission 2	
Emission 3	
Emission 4	

Please describe the formulae used to estimate the anthropogenic emissions by sources of greenhouse gases of the baseline (for each gas, source, formulae/algorithm, emissions in units of CO_2 equivalent).

D 3.8 Calculation of leakage emissions	
Leakage 1	
Leakage 2	

Please present the calculation including the basis and method of calculation.

D 3.9 Calculation of total baseline emissions *(EB PDD E.6.)*						
	Year 1	Year 2	Year 3	Year 4	Year...	∑
Emissions (in t CO_2/year)						
Leakage (in t CO_2/year)						
Total emissions (in t CO_2/year)						

CO2 Emission Reduction		**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2004-2007**	**2008-2012**
Baseline CO2 Emissions	kt CO2/a	25,929	25,656	27,100	28,965	29,420	29,955	27,506	28,132	26,140	107,650	141,153

D 4 EMISSION REDUCTIONS

D 4.1 Expected emission reductions *(EB PDD E.5., EB PDD E.6.)*						
	Year 1	Year 2	Year 3	Year 4	Year	Σ
Expected total project emissions (in t CO_2/year)						
Expected total baseline emissions (in t CO_2/year)						
Expected total emission reductions (in t CO_2/year)						

CO2 Emission Reduction		**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2004-2007**	**2008-2012**
Baseline CO2 Emissions	kt CO2/a	25,929	25,656	27,100	28,965	29,420	29,955	27,506	28,132	26,140	107,650	141,153
Project CO2 Emissions	kt CO2/a	25,922	25,649	27,084	28,949	29,190	29,732	27,282	27,901	25,909	107,604	140,013
Total CO2 Reduction	kt CO2/a	**6.78**	**7.45**	**15.15**	**16.58**	**229.57**	**223.32**	**224.49**	**230.88**	**231.73**	**45.96**	**1,140.00**

D 4.2 Sensitivity analysis	
Sensitivity analysis *A sensitivity analysis illustrating the effects of the variation of the influencing factors described in D 1.4. is to be enclosed.*	In the Monitoring Plan for the Vacha Cascade Project the marginal plant in each hour of the year will be analyzed based on the actual dispatch order. Therefore any change 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.

D 4.3 Additionality	
Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the project activity *Please explain, how and why this project is additional and therefore not the baseline scenario.* *For analysing the additionality of a project please take into account*	In the Baseline Scenario, a mix of coal fired power plants is operating at the margin. Due to the implementation of the Vacha Cascade JI Project output from these marginal plants is replaced by electricity generated in hydro power plants. This leads to the emission reductions. All further details are shown in the Baseline Study.

the relevant decisions of the Executive Board[5] (e.g. EB 10 Report, Annex 1[6]). *(EB PDD B.4.)*	

[5] Cp. http://cdm.unfccc.int/EB/.

[6] Cp. http://cdm.unfccc.int/EB/Meetings/010/eb10repan1.pdf.

E Monitoring Methodology and Plan

Emission reductions can only be acknowledged when these are proved by traceable monitoring of the project activities and emissions.

Since the monitoring plan should document the actually achieved emission reductions as well as significant additional ecological, socio-economic and development effects it can only be filled in after the project has already been implemented. No differentiation is made between a JI and CDM project regarding the structure of the monitoring plan. Specific regulations are however applicable to CDM small-scale projects. The EB prepared a monitoring template for small-scale projects (SSC) which is available at http://unfccc.int/cdm/.

The monitoring reports must be delivered by the contractual party to an independent verification entity (IE or OE) at regular intervals. This entity examines the reports. Monitoring data must be kept for at least 2 years after the end of the crediting period or the last transfer of ERUs or CERs.

Details of theoretical fundamentals of the monitoring are described in part 1 of the guide.

The monitoring plan encompasses the following five areas:

1. development of the monitoring plan and methodology,
2. organisation and procedures of monitoring regarding the calculation of ERUs/CERs,
3. review of significant additional ecological, socio-economic and development effects of the project,
4. quality assurance,
5. responsibilities.

E 1 DEVELOPMENT AND METHODOLOGY

E 1.1 Details of monitoring plan development	
Name and address of person/entity determining the monitoring methodology *Please provide contact information and indicate if the person/entity is also a project participant.* *(EB PDD D.7.)*	The Monitoring Methodology and Plan Study for the Vacha Cascade JI Project has been prepared in a separate document. **KWI Management, Consultants & Auditors GmbH** Burggasse 116 A-1070 Wien Manfred Stockmayer ms@kwi.at Gerald Dunkel dg@kwi.at
Date of completing the final draft of the monitoring plan (DD/MM/YYYY)	12 September 2003

The following description and substantiation of the monitoring methods used is mandatory for CDM projects. Authorised methods are available at http://unfccc.int/cdm/. New methods are to be substantiated and submitted to the EB for appraisal (in the case of CDM projects).

E 1.2 Approved methodology	
Name and reference of approved methodology applied to the project activity *If a national or international monitoring standard has to be applied to monitor certain aspects of the project activity, please identify this standard and provide a reference to the source where a detailed description of the standard can be found.* *(EB PDD D.1.)*	
Justification of the choice of the methodology and why it is applicable to the project activity *(EB PDD D.2.)*	

E 2 CALCULATION OF ERUS OR CERS

In order to determine the actual emission reductions generated by the project the monitoring plan is based on the baseline study.

Emission Reductions = (Baseline Emissions) — (Project Emissions)

Project emissions

E 2.1 Data relevant for monitoring project emissions *(EB PDD D.3.)*	
ID number *Please use numbers to ease cross-referencing.*	Emissions from Project activity: 0 As the project produces no emissions, no data has to be collected to monitor emissions. Electricity generation from the Vacha Cascade is necessary to calculate baseline emissions. Therefore the monitoring system for the generation data is described in the Monitoring Plan.
Data type	
Data variable	
Data unit	
Data quality	Measurement ○ Yes: _____ (*State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ *(State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	
Proportion of data to be monitored	

How will the data be archived?	○ Electronic ○ In paper form
For how long is archived data to be kept?	
Comment	

The table is to be filled in separately for each data type and should therefore be copied as often as required.

E 2.2 Data relevant for monitoring leakage *(EB PDD D.4.)*	
ID number *Please use numbers to ease cross-referencing.*	As the entire Bulgarian Electric Power System is taken into consideration for the calculation of the emission reductions generated by the Vacha Cascade JI Project, no leakage can occur
Data type	
Data variable	
Data unit	
Data quality	Measurement ○ Yes: _____ (*State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ *(State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	

Proportion of data to be monitored	
How will the data be archived?	○ Electronic ○ In paper form
For how long is archived data to be kept?	
Comment	

The table is to be filled in separately for each data type and should therefore be copied as often as required.

Baseline emissions

Depending on the methodology used to determine the baseline the following tables may need to be filled in.

E 2.3 Data relevant for monitoring baseline emissions *(EB PDD D.5.)*	
ID number *Please use numbers to ease cross-referencing.*	GVC
Data type	Electricity Generation Tsankov Kamak, Teshel, Devin, Orpheus, Krichim
Data variable	GVC: Generation Vacha Cascade
Data unit	MWh

Data quality *(If no data will be collected on this item, please explain the reason.)*	Measurement ☒ Yes: _____ Data are obtained from the metering system of the power plants (*State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____

	(State how the calculation is performed.) ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	hourly
Proportion of data to be monitored	
How is data archived?	☒ Electronic ☒ In paper form
For how long is data archived to be kept?	2014
Comment	

E 2.3 Data relevant for monitoring baseline emissions *(EB PDD D.5.)*	
ID number *Please use numbers to ease cross-referencing.*	EC1 EC2
Data type	Efficiency Coefficients: Teshel, Devin, Orpheus, Krichim
Data variable	EC1: Efficiency Coefficient after Rehabilitation EC2: Efficiency Coefficient before Rehabilitation
Data unit	

Data quality *(If no data will be collected on this item, please explain the reason.)*	Measurement ○ Yes: _____ (*State how the measurement is performed and the data quality ensured.)* ☒ No

	Calculation ☒ Yes: _____ Efficiency coefficients 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'. *(State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	
Proportion of data to be monitored	
How is data archived?	☒ Electronic ☒ In paper form
For how long is data archived to be kept?	2014
Comment	

E 2.3 Data relevant for monitoring baseline emissions *(EB PDD D.5.)*	
ID number *Please use numbers to ease cross-referencing.*	PC CMP GMP
Data type	Marginal and Next Marginal Plant, available capacity and actual generation
Data variable	1. PC: Plant Code 2. CMP: Capacity Marginal Plant

	3. GMP: Generation Marginal Plant
Data unit	1. Number 2. MW 3. MWh

Data quality *(If no data will be collected on this item, please explain the reason.)*	Measurement ☒ Yes: _____ Real time dispatch order, reported by NDC. (*State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ *(State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	hourly
Proportion of data to be monitored	
How is data archived?	☒ Electronic ☒ In paper form
For how long is data archived to be kept?	2014
Comment	

E 2.3 Data relevant for monitoring baseline emissions *(EB PDD D.5.)*	

ID number *Please use numbers to ease cross-referencing.*	EF
Data type	Emission Factor Marginal and Next Marginal Plant
Data variable	EF: Emission Factor
Data unit	tCO_2/GWh

Data quality *(If no data will be collected on this item, please explain the reason.)*	Measurement ○ Yes: _____ (*State how the measurement is performed and the data quality ensured.)* ○ No Calculation ☒ Yes: _____ The specific heat rates are manually calculated for the previous month at each TPP. The carbon contents are measured accordingly *(State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	monthly
Proportion of data to be monitored	
How is data archived?	☒ Electronic ☒ In paper form
For how long is data archived to be kept?	2014
Comment	

The table is to be filled in separately for each data type and should therefore be copied as often as required.

E 2.4 Data relevant for monitoring leakage	
ID number *Please use numbers to ease cross-referencing.*	As the entire Bulgarian Electric Power System is taken into consideration for the calculation of the emission reductions generated by the Vacha Cascade JI Project, no leakage can occur
Data type	
Data variable	
Data unit	
Data quality *(If no data will be collected on this item, please explain the reason.)*	Measurement ○ Yes: _____ *(State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ *(State how the calculation is performed.)* ○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	
Proportion of data to be monitored	
How will the data be archived?	○ Electronic ○ In paper form
For how long is archived data to be kept?	
Comment	

The table is to be filled in separately for each data type and should therefore be copied as often as required.

Emission reductions

E 2.5 Emission reductions	
Calculation of emission reductions	Plants running at the margin (with the highest cost) will be the first to be replaced. Without the implementation of the Vacha Cascade Project the marginal plant (and in some cases the next marginal plant) would increase its generation by the same quantity, the Vacha Cascade is generating in this hour. Emission reduction: The incremental generation of the marginal plant and the next marginal plant multiplied by the plant specific emission factors.

E 3 ECOLOGICAL, SOCIO-ECONOMIC AND DEVELOPMENT EFFECTS

A monitoring plan is to be created for major ecological, socio-economic and development effects of the project. If applicable, the following table shall be used.

E 3.1 Data relevant for monitoring ecological, socio-economic and development effects of the project	
ID number *Please use numbers to ease cross-referencing.*	The Monitoring reports on the actual environment and development performance of the Vacha Cascade JI project. The ecological, social-economic and developments impacts are described in chapter 'B Ecological, Socio-Economic and Development Aspects'. As discussed and agreed with the Austrian Kommunalkredit Pulic Consulting (KPC), monitoring, recording and reporting the ecological, socio-economic and development aspects, will be organized by an extra chapter within the annual Monitoring Reports. The chapter documents the impacts during the construction and operation phase of the Vacha Cascade project. The collection of data, recording and reporting is in all cases the responsibility of the project operator NEK EAD, who will also prepare the corresponding chapter of the annual Monitoring Reports. Monitoring Data Examples as shown in chapter IV.A will be applied. The following topics will be analyzed and discussed: ☒ ecological effects (protection of biological resources in the project region, water, waste, air, land, biodiversity, noise) ☒ socio-economic effects (job creation during the construction and operation phase, social security, gender equality) ☒ development effects (, sustainability, increase on economic activities in the project region) NEK's commitment to the monitoring obligations is documented in the Annexe PDD III.Q Annex 17: NEK Declaration of Intend.
Data type	ecological., socio-economic and development aspects
Data variable	
Data unit	
Data quality	Measurement ○ Yes: _____ (*State how the measurement is performed and the data quality ensured.)* ○ No Calculation ○ Yes: _____ *(State how the calculation is performed.)*

	○ No Estimate ○ Yes: _____ *(State which assumptions the estimate is based on and how it is performed.)* ○ No
Recording frequency	Annual Monitoring Reports
Proportion of data to be monitored	

How will the data be archived?	☒ Electronic ☒ In paper form
For how long is data archived to be kept?	2014
Comment	

The table is to be filled in separately for each data type and should therefore be copied as often as required. Examples of data relating to particular environmental media and socio-economic and development aspects are included in the appendix.

E 4 PROCESS, QUALITY AND SELF-CHECKING

The entire process of data acquisition and processing must be documented. In addition a system for information procurement and processing and quality control must be established. Furthermore, the monitoring should be capable of self-checking using plausibility checks.

E 4.1 Procedures	
Data *Please indicate table and ID number.* *(EB PDD D.6.)*	All data. All details are described in the Vacha Cascade Monitoring Plan.
Data acquisition (including measuring methods)	Data are obtained from the metering system of the power plants. Using methods according to international standards. Real time dispatch order, reported by NDC.
How is the data transmitted?	Via Email
Uncertainty level of data (high/medium/low) *(EB PDD D.6.)*	low
Are quality assurance/quality control procedures planned for these data? *Please add an explanation.* *(EB PDD D.6.)*	☒ Yes: _____see MP_____ ○ No: _____
Measures for quality assurance	Control system according to international standards, applying international standards.
Checking of data for consistency, completeness and correctness	Routine check and final examination of the monthly reports by the project operator. Final inspection of the annual Monitoring Reports.
How are errors during data acquisition dealt with?	Errors identified and corrective measurements are documented in special reports and added to the monthly reports.

E 5 RESPONSIBILITIES

E 5.1 Responsibilities	
Technical responsibility	Name of Contact Person.....Mr: Krustio Botev ..... Address.....NEK EAD Hydroelectroinvest Branch .... 5 Veslets Street; 1040 Sofia, Bulgaria..... Phone / Fax.....+359 2 986 56 06..... E-mail.....kbotev@heinvest.com.....
Commercial responsibility	Name of Contact Person.....Mr. Lubomir Velkov ..... Address.....NEK EAD..... ..... 5 Veslets Street; 1040 Sofia, Bulgaria..... Phone / Fax.....+359 2 986 56 06..... E-mail.....lvelkov@nek.bg.....
Responsibility for data acquisition	Name of Contact Person.....Mr. Christo Schwabski..... Address.....NEK EAD..... .... 5 Veslets Street; 1040 Sofia, Bulgaria..... Phone / Fax.....+359 2 980 1968..... E-mail.....hshvabski@nek.bg.....
Responsibility for calculation of emission reductions	Name of Contact Person.....Mr. Christo Schwabski..... Address.....NEK EAD..... .... 5 Veslets Street; 1040 Sofia, Bulgaria..... Phone / Fax.....+359 2 980 1968..... E-mail.....hshvabski@nek.bg.....
Responsibility for monitoring supervision	Name of Contact Person.....Mr. Lubomir Velkov ..... Address.....NEK EAD..... ..... 5 Veslets Street; 1040 Sofia, Bulgaria..... Phone / Fax.....+359 2 986 56 06..... E-mail.....lvelkov@nek.bg.....

III. Annexes

A Annex 1: Bulgaria Map
File: < Annex PDD 1 Bulgaria Map>

B Annex 2: Site Plan Vacha Cascade
File: <Annex PDD 2 Site Plan Vacha Cascade>

C Annex 3: Time Schedule Vacha Cascade JI Project
File: < Annex PDD 3 Time Schedule Vacha Cascade JI Project>

D Annex 4: Letter NEK to Kommunalkredit Austria AG
File:< Annex PDD 4 Letter NEK-Kommunalkredit>

E Annex 5: Environmental Impact Assessment Tsankov Kamak Integrated Water-Power System Volume 1
File: < Annex PDD 5 EIA Volume 1>

F Annex 6: Environmental Impact Assessment Tsankov Kamak Integrated Water-Power System Volume 2
File: < Annex PDD 6 EIA Volume 2>

G Annex 7: Republic of Bulgaria, Ministry of Environmental: Decision on Environmental Impact Assessment
File: < Annex PDD 7MoE Decision on EIA>

H Annex 8: Letter of Endorsement Vacha Cascade Project
File: < Annex PDD 8 Letter of Endorsement>

I Annex 9: Tsankov Kamak Area
File: < Annex PDD 9 Tsankov Kamak Area>

J Annex 10: Stakeholder Comments, Municipally Devin
File: < Annex PDD 10 Stakeholder Comment Community Devin>

K Annex 11: Vacha Cascade Schematic Layout
File: < Annex PDD 11 Vacha Cascade Schematic Layout>

L Annex 12: Vacha Cascade Vertical Scheme
File: < Annex PDD 12 Vacha Cascade Vertical Scheme>

M Annex 13: Bulgarian EPS
File: < Annex PDD 13 Bulgarian EPS>

N Annex 14: EIA List of Enclosures 1 - 11
File: < Annex PDD 14 EIA List of Enclosures 1 - 11>

O Annex 15: Obligatory Tests of HPP Equipment

File: <Annex PDD 15 Obligatory Tests of HPP Equipment>

P Annex 16: Order for improving technical operation of HPP

File: <Annex PDD 16 Improving Technical Operation HPP>

Q Annex 17: NEK Declaration of Intend

File: <Annex PDD 17 NEK Declaration of Intend>

IV. Appendix

A Monitoring Data Examples regarding Ecological, Socio-Economic and Development Effects

Ecological Effects

Water

Ap A 1 Effects on the medium water	
Abstraction of ground water	Abstraction: _____ m³/week
Abstraction of surface water	*River* Abstraction: _____ m³/second Mean low water: _____ m³/second *Lake* Abstraction: _____ m³/second Regeneration of water (inflow): _____ m³/second
Pollution of surface water	*Before discharge of effluents* Water quality according to biological water organisms: _____ *(Please refer to your country specific regulations.)* Oxygen content in the water: _____ mg/l Ammonia concentration: _____ mg/l NH4-N *After discharge of effluents* Water quality according to biological water organisms: _____ *(Please refer to your country specific regulations.)* Oxygen content of the water: _____ mg/l Ammonia concentration: _____ mg/l NH4-N Average temperature increase in the receiving water body: _____ °C
Further particular effects within the framework of the local conditions	

Air

Ap A 2 Effects on the medium air	
Emissions	SO_2: _____ mg/ m^3 NO_x: _____ mg/ m^3 Dust: _____ mg/ m^3 Organ. C: _____ mg/ m^3 HCl: _____ mg/ m^3 Dioxins and furans: _____ mg/ m^3 Hg: _____ mg/ m^3 Other: _____ mg/ m^3
Further particular effects within the framework of the local conditions	

Land

Ap A 3 Land use	
Land use	_____ m^2
Effects caused by the project	Erosion: _____ Landslip: _____ Other: _____

Biodiversity

Ap A 4 Effects on biodiversity	
Diversity of flora	
Local fauna	

Waste

Ap A 5 Waste	
Amounts of non hazardous wastes and details of treatment	
Amounts of hazardous wastes and details of treatment	
Other project influences on the occurrence of wastes	

Socio-Economic and Development Effects

Ap A 6 Job creation	
Creation of new jobs through the project	Number of highly qualified jobs: _____ Number of low qualified jobs: _____

Ap A 7 Social security	
Social security of workforce	

Ap A 8 Gender equality	
Equal Opportunities	*Middle Management* Number of women: _____ Number of men: _____ *Upper Management* Number of women: _____ Number of men: _____

Sustainability

Ap A 9 Sustainability	
Contribution of the project to the sustainable development of the host country	

B Comparison of the EB PDD (Version 01) and the PDD of the Austrian JI/CDM Programme

The Executive Board PDD is not as comprehensive as the PDD of the Austrian JI/CDM Programme. Since for CDM projects the EB PDD is to be filled additionally, the following table illustrates where information is already contained in the Austrian PDD to facilitate filling in of the EB PDD.

Executive Board PDD (Version 01)	Austrian JI/CDM Programme PDD
A. General description of project activity	
A.1. Title of the project activity	A 1
A.2. Description of the project activity	A 2.1, B 4.2
A.3. Project participants	A 3
A.4. Technical description of the project activity	
A.4.1. Location of the project activity	A 4.1, A 4.2
A.4.2. Category(ies) of project activity	A 2.2
A.4.3. Technology to be employed by project activity	A 6.1, B 4.2
A.4.4. Brief explanation of how the emissions by sources are to be reduced	B 4.1
A.4.5. Public funding of the project activity	A 7.1
B. Baseline methodology	
B.1. Title and reference of the methodology	D 3.1
B.2. Justification of the choice	D 3.1
B.3. Description of how the methodology is applied	D 3.1
B.4. Description of how emissions are reduced below those that would have occurred in the absence of the project activity	D 4.3
B.5. Application of the project boundary to the project activity	D 1.3
B.6. Details of baseline development	D 1.1
C. Duration of the project activity/crediting period	
C.1. Duration of the project activity	A 5.1
C.1.1. Starting date of project activity	A 5.1
C.1.2. Expected operational lifetime of the project activity	A 5.1
C.2. Choice of the crediting period	A 5.2
C.2.1. Renewable crediting period	A 5.2
C.2.2. Fixed crediting period	A 5.2
D. Monitoring methodology and plan	
D.1. Name and reference of approved methodology	E 1.2
D.2. Justification of the choice of the methodology	E 1.2

D.3. Data to be collected to monitor emissions from the project activity	E 2.1
D.4. Potential sources of emissions which are attributable to the project activity, but not included in the project boundary	E 2.2
D.5. Relevant data necessary for determining the baseline of emissions within the project boundary	E 2.3
D.6. Quality control (QC) and quality assurance (QA) procedures	E 4.1
D.7. Name of person/entity determining the monitoring methodology	E 1.1
E. Calculation of GHG emissions by sources	
E.1. Description of formulae used to estimate emissions within the project boundary	D 2.3
E.2. Description of formulae used to estimate leakage	D 2.4
E.3. The sum of E.1. and E.2.	D 2.5
E.4. Description of formulae used to estimate baseline emissions	D 3.7
E.5. Difference between E.3. and E.4. (Emission reductions)	D 4.1
E.6. Table providing values obtained when applying formulae above	D 2.3, D 2.4, D 2.5, D 3.7, D 3.9, D 4.1
F. Environmental impacts	
F.1. Analysis of the environmental impacts (including transboundary impacts)	B
F.2. Conclusions and references regarding environmental impacts	B
G. Stakeholder comments	
G.1. Brief description of the process on how comments by local stakeholders have been invited and compiled	C 2
G.2. Summary of the comments received	C 2
G.3. Report on how due account was taken of any comments received	C 2

C Emission Factors

The following CO_2 emission factors for particular fuels originate from the IPCC (International Panel on Climate Change) 1996 'Revised Guidelines for National Greenhouse Gas Inventories' (www.ipcc.ch/pub/guide.htm).

Fuel	Net caloric value (TJ/1000 t)[7]	Carbon content (tC/TJ)	CO_{2eq} share[8]) (tCO_{2eq}/TJ)
Primary fuels			
Anthracite	a)	26.8	98.27
Other Bituminous Coal	a)	25.8	94.60
Coking Coal	a)	25.8	94.60
Sub-bituminous Coal	a)	26.2	96.07
Lignite	a)	27.6	101.40
Oil Shale	9.40	29.1	106.70
Peat	---	28.9	105.97
Crude Oil	a)	20.0	73.33
Natural Gas	---	15.3	56.10
Methane	---	(15.0)	55.00
Secondary fuels			
Gasoline	44.80	18.9	69.30
Gas/Diesel	43.33	20.2	74.07
Jet Kerosene	44.59	19.5	71.50
Other Kerosene	44.75	19.6	71.87
Residual Fuel Oil	40.19	21.1	77.37
Liquefied Petroleum Gas	47.31	17.2	63.07
Bitumen	40.19	22.0	80.67
Lubricants	40.19	20.0	73.33
Petroleum Coke	31.00	27.5	100.83
Coke Oven/Gas Coke	---	29.5	108.17
Coke Oven Gas	---	13.0	47.67
Blast Furnace Gas	---	66.0	242.00

Tabelle 1: Emission factors

[7] a): country specific data in the 'Revised IPCC Guidelines for National GHG Inventories (1996)'.

[8] Conversion coefficient: 1 t C = 44/12 t CO_2.