CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

Jradzor Small Hydroelectric CDM project

Completed in December 2007. Version 3.

A.2. Description of the small-scale project activity:

The proposed project activity involves implementation and operation of a 5.930 MW Small Hydroelectric grid connected renewable energy project on the irrigation canal of Akhuryan, located in Shirak region.
The electricity generated by Jradzor SHPP will be sold to the Armenian Electricity Network (AEN).

Purpose of the project activity

The main purpose of the project activity is generation of clean hydroelectric energy and contribution to climate change mitigation efforts.

View of project participants on the contribution of the project activity to sustainable development

Ministry of Environment Protection of Armenia as the DNA has stipulated the following draft1 indicators (criteria) for assessment of the project's contribution to the country's sustainable development:[1]

1. Social Criteria

"The project has positive effects on social development."

The project activity will create jobs opportunities in the area with very high unemployment level for skilled and unskilled labor during the construction and operation of the plant.

The implementation of the project will benefit the Armenia through development of additional sustainable generation capacity not dependant on the imported energy sources, which will add to the independence of the energy system of the Republic as well. The new road will be constructed on-site.

Implementation of the project will also contribute to development of experience and intellectual capacity among the local construction workers that will go through a set of trainings, organized by the Project Host during the project implementation, which will help them to become a skilled work force in future as well.

2. Environmental Criteria

"The CDM project leads to positive or decreased negative environmental effects."

[1] It is expected that these indicators will be approved by the end of 2007

According to the Environmental Impact Assessment conducted for this project, the construction of the Jradzor SHPP will not affect the quality of the river water, as well as the well being of the local population.

3. Economic Criteria

"The project has positive effects on the economic development of the country."

During the operation of the Jradzor SHPP the expected tax revenue (including local – property taxes, and state – VAT and income taxes) will account to around $200 000 USD per annum. The project will attract around $2,500,000 USD investment. The project implementation will also generate employment possibilities for the local population which lacks available workplaces in their region.

During the project implementation locally produced equipment will be used which will benefit the renewable energy technology an intellectual capacity development in Armenia.

4. Policy effect criteria

The project has positive effects on the achievement of national, regional and sector priority objectives."

The project activity complies with the Energy Strategy of Republic of Armenia which promotes the development of new renewable energy technologies and capacities. In addition, implementation of the project will also contribute to the sustainable development of Armenia through reducing the dependence on imported energy carriers, such as natural gas, thereby reducing the outflow of capital from Armenia to other countries.

A.3. Project participants:

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Republic of Armenia (host)	**Private entity: ANI OJSC**	**No**
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

A.4. Technical description of the small-scale project activity:

Jradzor SHPP is located in irrigation canal of Akhuryan, in Shirak region. The water canal possesses 6.0 m^3/s maximum capacities and carries out hydraulic works from the River Akhuryan through headwork facilities located 3.5 km far from designed Small Hydropower Plant of Jradzor. Current project will use water pressure, which is created between tail-end of designed water reservoir and irrigation canal. The latter flows parallel to the River Akhuryan. The distance between water canal and the River Akhuryan is about 700 m. Jradzor SHPP will include the following principal premises and units:

- Penstock Forebay;
- Penstock;
- Headrace Flume;
- Station unit and Head Unit

Penstock Forebay

Penstock forebay will be built through reconstruction of irrigation water canal. Water supply point of irrigation canal is realized through separate facilities of penstock head. The latter is located perpendicularly to the axle of the water canal. It is foreseen to establish side weir in the reconstructed unit. For the periodical cleaning of the penstock forebay it is foreseen to install vertical lift-gate (1.0m x 1.0m) equipped with electrical and manual control panel.

Penstock

The penstock is of unifilar type. The total length of the penstock equals to 670 m with 1220mm diameter. At the end point the penstock is transformed into supply manifold with 2 pipe-bends (it depends on the quantity of hydropower units). At the starting point, the penstock is closed and located in the trench with subsequent covering. The second unit of the penstock is located within the slump of the relief (gorge of the River Akhuryan). For allotment of accidental water (in case of penstock severance), it is foreseen to install concrete gutter.

Headrace Flume

Since Hydropower station operates during non-irrigation period, primarily in winter times, when temperature is relatively severe, it is foreseen to install isolating facilities for avoiding ice-covering. Isolating facilities will cover the irrigation canal over a length of 1230m, starting from downstream portal of drain siphon to penstock forebay.

Station Unit and Head unit

Station Unit and Head Unit of Jradzor SHPP are located in the right bank of the River Akhuryan near to village Amasia. The canyon of the River is relatively deeper and narrower in the alignment of Station Unit. Station area is located at the end of pressure derivation and has minimum width. Taking into

consideration this fact both station area and the Head unit of Jradzor SHPP are designed as terrace-typed for the purpose of facilitating soil preparation works.

As mentioned above, station area is narrower and is limited with emergency discharging canals. Head unit of Jradzor SHPP should be equipped with two-packaged hydropower equipment with 4.0 MW installed capacity. Designed pressure of the plant is 142.6 m. Designed outlet is 2.0 m^3/sec. It is characterized with the following indicators:

- Installed capacity 5.930 MW
- Quantity of hydropower equipment 2 units
- Designed level of upper pool 1919 m
- Designed level of lower pool 1773 m
- Normal level in case of 1 hydropower equipment 1772.2 m
- Designed Pressure 142.6 m
- Designed Outlet 2.0 m^3/sec
- Annual average electricity generation 20.0 million KWh

A.4.1. Location of the small-scale project activity:

A.4.1.1. Host Party(ies):

Republic of Armenia

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

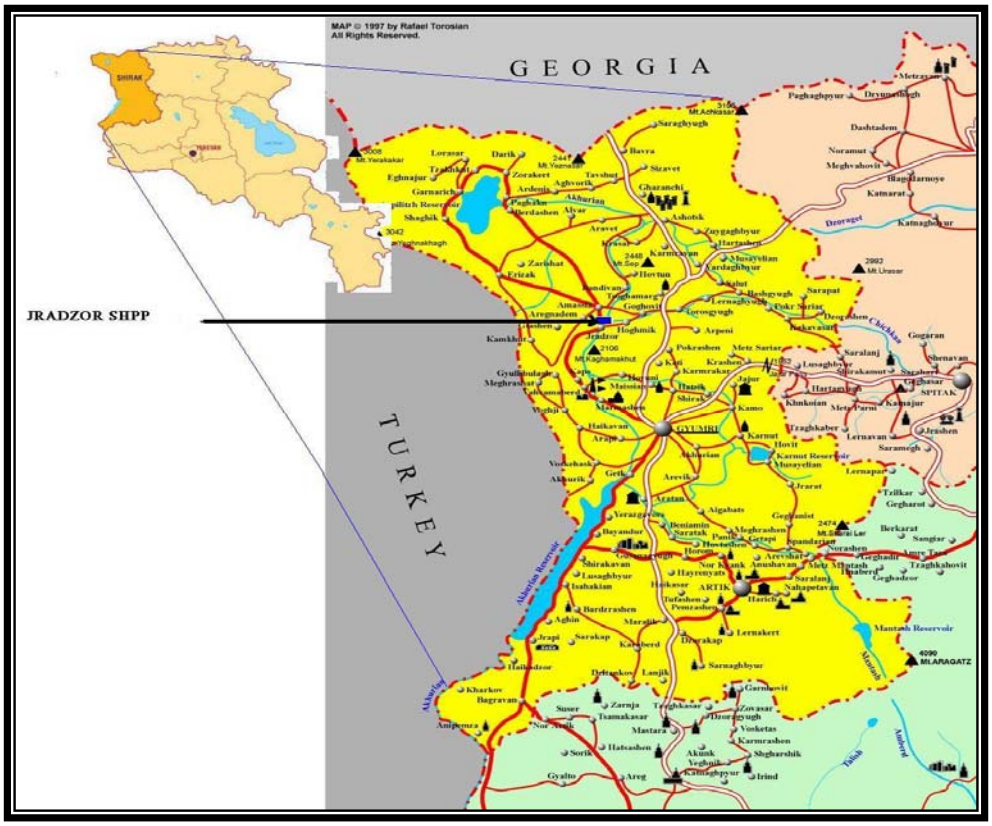
Shirak Marz

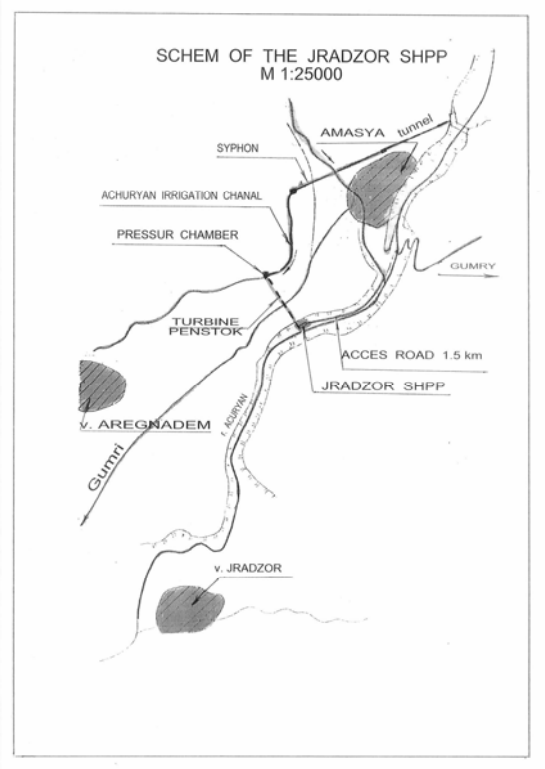
A.4.1.3. City/Town/Community etc:

Jradzor village

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

Jradzor SHPP will be constructed on the right-bank irrigation canal of the river of Akhuryan, near the district center Amasiya. The geographical location of Jradzor SHPP is detailed in the maps below.


MAP © 1997 by Rafael Torosian
All Rights Reserved.
GEORGIA
TURKEY
JRADZOR SHPP
SHIRAK
LORI
GYUMRI
SPITAK
Akhuryan Reservoir
Mantash Reservoir
MT.ARAGATZ



The Jradzor SHPP has the following GPS coordinates:

Latitude: 40° 56’ 48’’

Longitude: 43° 45’ 53’’

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

The project activity utilizes the hydro potential of Akhuryan irrigation canal for power generation and exports the generated power to the grid. According to small-scale CDM modalities the project activity falls under

Type – I – Renewable Energy Projects and
Category I-D – Grid connected renewable electricity generation.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

Year	Estimation of emission reductions (tonnes of CO_2)
2008	8 734
2009	8 734
2010	8 734
2011	8 734
2012	8 734
2013	8 734
2014	8 734
2015	8 734
2016	8 734
2017	8 734
Total (tonnes of CO2)	87 340

A.4.4. Public funding of the small-scale project activity:

Total funding required for the project does not include any public funding from Annex I countries.
Hence, the project proponents hereby confirm that public funding from parties included in Annex -I is not involved in the project activity.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

According to the Appendix C of the Simplified Methodologies and Procedures for the small-scale CDM, this Project activity is not a debundled component of a larger project activity because there is not a registered small-scale CDM project activity or an application to register another small-scale CDM project:

- With the same project participants
- In the same project category and technology/measure;

- Registered within the previous 2 years;
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

Hence, the project is eligible as a small-scale CDM project and can use the simplified modalities and procedures for small-scale CDM project activities.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity:

Type I: Renewable Energy Projects
I.D. 'Grid connected renewable electricity generation'

B.2 Justification of the choice of the project category:

As per the provisions of simplified modalities and procedures for small scale CDM project activities (version 12), Type I. D "comprises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal, and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit. If the unit added has both renewable and non-renewable components (*e.g.* a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.

Project activity meets the applicability conditions of the methodology in following manner:

1. The project activity utilizes the hydro potential of Akhuryan irrigation canal for power generation and exports the generated power to the grid

2. The installed capacity of the proposed project is only 5.93 MW, which is less than the qualifying capacity of 15 MW.

B.3. Description of the project boundary:

According to methodology AMS-ID, the project boundary encompasses the physical, geographical site of the renewable electricity generation source. Hence, the project boundary is the 10.5 hectare area where the powerhouse and transmission line is placed including the connection point with AEN – Jradzor substation.

CDM – Executive Board

B.4. Description of baseline and its development:

Baseline methodology

Option (a) of paragraph 9 of the latest version of the methodology from project type "I.D Grid connected renewable electricity generation" defines the baseline as the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO2e/kWh) calculated in a transparent and conservative manner as the combination of the "operating margin" and the "build margin", where:

(i) The "operating margin (OM)" is based on one of the following methods: a) Simple OM b) Simple adjusted OM c) Dispatch data analysis OM d) Average OM. The OM emission factor can be calculated using either of the two following data vintages for years(s) y:

Option 1: The full generation-weighted average for the most recent 3 years for which data are available at the time of submission of the PDD

Option 2: The year in which project generation occurs, if emission factor is updated based on ex post monitoring.

(ii) The "build margin" is the weighted average emissions (in kg CO2equ/kWh) of recent capacity additions to the system, based on the most recent information available on plants already built for sample group m at the time of PDD submission. The sample group m consists of either the five power plants that have been built most recently, or the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. Project participants should use from these two options that sample group that comprises the larger annual generation. Power plant capacity additions registered as CDM project activities should be excluded from the sample group m. If 20% falls on part capacity of a plant, that plant is included in the calculation.

The build margin emission factor can be calculated using either of the following data vintages for years(s) y:

• Option 1: Most recent information available on plants already built at the time of PDD submission.

• Option 2: For the first crediting period, emission factor is updated based on ex-post monitoring. For subsequent crediting periods, emission factor should be calculated ex-ante, as described in option 1 above.

Option a) is selected for this project because the project will displace mostly fossil-fuel generating sources since they are at the margin of the electricity generation system. Future capacity additions will be predominated on fossil fuel based power plants (particularly it is expected than in 2008-2009 two new plants will be launched – Hrazdan TPP Unit No5 (450 MW) and Yerevan TPP New Unit (215 MW).

Taking into consideration the fact that most of the generation facilities and their equipment (more than 95%) are very old, the majority of those being constructed during the mid-soviet period, and the fact that the new generation units are under construction at the Hrazdan TPP and the Yerevan TPP and about 40 new small HPPs has got licenses for construction, the power generation mix will be significantly changing in the nearest future.

Thus it makes sense to calculate the baseline in the year, in which project generation occurs, calculating the emission factor based on the ex-post monitoring during the crediting period. The data necessary for ex-post calculation is publicly available in Armenia and can be provided by PSRC upon request. The current data on Armenian power plants will be used prior to the point at which the first new plant will be added to the grid and start producing electricity. Each month the project proponent will update the information on newly constructed and commissioned power plants with the PSRC and recalculate emission factor.

The key information and data used to determine baseline scenario (variables, parameters, data sources etc) are listed in the following table.

Table 1 Key information and data used to determine baseline scenario

Key Parameter	Value	Data Source
Power Generation	Power generated by all sources	Public Services Regulating Commission of RA, PSRC
Fuel type and consumption	Fuel type and consumption in individual power plants	Public Services Regulating Commission of RA, PSRC, Government of Armenia, which adopted the "Energy Sector Development Strategies in the Context of Economic Development in Armenia", August 2005
Power Plants Own Consumption (PPOC) n	Power consumed by power plants	Public Services Regulating Commission of RA, PSRC
Oxidation factor	Oxidation factor for each fuel type	IPCC default oxidation factor for fuels
EF_y	Baseline emission factor of the grid	Calculated for power plants in Armenia
EG_y	Electricity generated by the project per annum	Will be taken from the plant
Lambda dispatch factor	Fraction of time during which low-cost / must run sources are on the margin	Energy Strategy Center

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

Prior consideration of the CDM

The project developer has seriously considered the benefits from CDM prior to the starting date. In particular, in November 2005 Ani OJSC has signed the contract with Karen Arabyan (the consultant engaged in the development of CDM project in Armenia) for the development of the PDD. Karen Arabyan, the consultant working for the project proponent, approached KPMG office in Yerevan for a proposal for validation on 12 December 2005. The proposal for validation in January 2006. On 2 June 2006 the proposal was reissued and agreed with DEPA. The project proponents firstly requested a Letter of Endorsement from the Armenian DNA on 15 December 2005 and acquired this letter on 26 January 2006.

In June 2006 the project proponent had started the implementation of the project, which was confimred by the validator during site visit in that period.

Therefore, the CDM was taken into consideration prior to taking the decision to implement the Project.

Justification for application of simplified methodologies to the project activity.

The installed capacity of the project is 5.93 MW, which is less than the limiting capacity of 15 MW and is thus eligible to use small-scale simplified methodologies. The project activity is generation of electricity for a grid system using hydro potential. Hence, the type and category of the project activity matches with I.D. as specified in Appendix B of the indicative simplified baseline and monitoring methodologies for small-scale CDM project activities. Justification for additionality of the project under the UNFCCC simplified modalities is to establish the additionality of the project activity according to the Attachment A of Appendix B, which lists various barriers, out of which, at least one barrier shall be identified due to which the project can not occurred any way. The analysis of existing barriers is presented below. The first step in the process is to list the likely future scenarios. Two scenarios were considered:

Scenario 1. The continuation of current activities – This scenario represents the continuation of current practices, which includes generation of electric energy with significant domination of fossil fuel – natural gas, which currently accounts to around 30% of the total energy generation mix. Besides, there are significant generation capacity additions through one unit of Hrazdan TPP and also on additional unit of Yerevan TPP.

Scenario 2. The construction of the new renewable energy plant – Jradzor SHPP. In this scenario, a new source of electricity generation capacity with no carbon emissions will be available that will displace the high carbon intensive electricity generation plants.

The barriers are as follows:

Financial/economical: This barrier evaluates the viability, attractiveness and financial and economic risks associated with each scenario, considering the overall economics of the project and/or economical conditions in the country.

Technical/technological: This barrier evaluates whether the technology is currently available, if there are indigenous skills to operate it, if the application of the technology is a regional, national or global standard, and generally if there are technological risks associated with the particular project outcome being evaluated.

Prevailing business practice: This barrier evaluates whether the project activity represents prevailing business practice in the industry. In other words, this barrier assesses whether in the absence of regulations it is a standard practice in the industry, if there is experience to apply the technology and if there tends to be high-level management priority for such activities.

With respect to **financial/economical** barriers:

- The continuation of current practices (Scenario 1) does not pose any financial/economical barrier to the project developer, and requires no further financing.

- The estimated investment for the Jradzor SHPP project is equal to $ 2.5 million USD, from which the equity financing is equal to $800,000 USD, and the other $1,700,000 USD was planned to be borrowed from financial institutions. The Project Developer has applied to a number of financial institutions that are currently providing loans for this kind of business activities. All the loan applications were denied or the offered conditions were unacceptable (18-23% interest rate, 3 years crediting period etc). The Company has obtained first license in 2001 but due to absence of dept financing couldn't complete construction. As a result the license was cancelled and Company paid penalties. In 2005 considering the possibility of using of carbon finance the Company again applied for a license and in February 2005 (07.02.2005) the Public Services Regulatory Commission of Armenia has granted a license to ANI OJSC for construction and exploitation of small hydropower plant.

- The only financial institution which is planned to provide loans for implementation of this kind of projects is Cascade Credit Universal Credit Organization (Cascade Credit UCO).

The funds of the Cascade Credit UCO come from the Renewable Resources and Energy Efficiency Fund (R2E2 Fund). But according to the Central Bank regulations the Cascade Credit UCO can not provide loans with more than $1,000,000 USD limit, because the authorized capital of the Cascade Credit UCO is

equal to $4,000,000, and the loan limit for any credit organization in Armenia should be less than 25%. Thus, in order to implement the Jradzor SHPP project the Project Developer would have to apply to a third party lending institution, which would create additional barriers for investments, such as shared collateral contracts, etc. In 2005 the project proponent has signed Letter of Intent with DEPA (Dansih Enviromental protection Agency), where DEPA has agreed to provide advance payment. However, in 2006 the Danish Environmental Protection Agency (DEPA) who was until that time participating in the project development withdrew from the project. That caused a delay of more than one year in the project realisation, because the DEPA would co-finance the project through advance payment of the CERs. During 2007 the project proponents finished the negotiations with EBRD/EIB Multilateral Carbon Credit Fund (MCCF) to fund the project through purchasing of the CERs of the project. This contract included an advance payment of the CERs which solved the missing part of the financing of the project.

From the conducted analysis it is evident that the project can not succeed without additional funds that can be provided as a prepayment for the CERs by the EBRD/EIB Multilateral Carbon Credit Fund (MCCF). The prepayment from MCCF is crucial for the implementation of the projects, since Cascade Credit has also agreed to provide financing only if the project would acquire CDM status (the letters from Cascade Credit and MCCF were provided to the validator).

With respect to the **technical/technological** barrier:

- Neither in the case of Scenario 1, nor in the case of Scenario 2, there are no technical/technological issues. The first case represents a continuation of current practices and does not involve any new technology or innovation. In case of Scenario 2 there are no significant technical/technological barriers as well, as all the technologies involved in this scenario are available in the market, and have been used effectively in Armenia.

With respect to the analysis of **prevailing business practice**:

- In the case of Scenario 1 there are no particular barriers for the continuation of current business practices with operation of existing facilities. In case of Scenario 2 there will be no significant deviations from the existing trend in the energy sector as well. Table 4 below summarizes the results of the analysis regarding the barriers faced by each of the proposed scenarios. As the table indicates, Scenario 1 faces no barriers, whereas Scenario 2 faces one important barrier – the financial/economic barrier.

Table 2 below summarizes the results of the analysis regarding the barriers faced by each of the proposed scenarios. As the table indicates, Scenario 1 faces no barriers, whereas Scenario 2 faces one important barrier – the financial/economic barrier.

Table 2: Summary of Barriers Analysis

Barriers evaluated	**Scenario 1**	**Scenario 2**
	Continuation of current situation	**Construction of Jradzor SHPP**

Financial/Economic	**NO**	**YES**
Technical	**NO**	**NO**
Prevailing Business practice	**NO**	**NO**

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

The data for the calculation of the operating and build margin were obtained from the following sources:

- Public Service Regulatory Commission of Armenia, which provided the following data:
  - the total electricity generation of Armenian power plants
  - the type of fuels consumed in 2005, quantity of the fuel consumed by the Thermal Power Plants
- Government of Armenia, which adopted the "Energy Sector Development Strategies in the Context of Economic Development in Armenia", August 2005 and which includes information on Armenian policies in the energy sector and fully describes the existing plants' operations (sub-units, commissioning dates, total electric capacity etc.)
- The Energy Strategy Centre, which is responsible for the collection and analysis of statistic information on electricity and heat energy demand and supply in the Republic of Armenia provided data necessary for the calculation of Lambda factor.

Choice of power plants for the calculation of the Operating Margin (OM).

The approved baseline methodology AMS. I.D. requires the project developers to calculate the Operating Margin (OM) emission factor in accordance with the procedures prescribed in the approved methodology ACM0002.

As per step 1 of ACM0002, the operating Margin emission factor (EFOM,y) is calculated based on one of the four following methods:

(a) Simple OM, or

(b) Simple adjusted OM, or

(c) Dispatch Data Analysis OM, or

(d) Average OM.

The Operating Margin is calculated on the basis of the option (b) Simple Adjusted OM.

As per the ACM0002 methodology Dispatch Data Analysis is the first methodological choice. However, this method is not selected, since no detailed information is available for to apply Dispatch Data Analysis Method. Furthermore, as it is evident from the table 3 below, generation by low-cost/must-run power sources exceeds 50%, requiring the calculation of a lambda factor to modify the results of the Simple OM Method (Simple Adjusted OM).

Table 3

Year	2005	2004	2003	2002	2001
Percentage of low-cost/must run resources in total electricity generation	70.75%	72.91%	72%	70%	50%
Average of five years					67,13%

Source: PSRC

The approved methodology ACM0002 outlines two options for data vintages for calculating the approximate operating margin emission factor and the weighted average emission factor:

• (ex-ante) the full generation-weighted average for the most recent 3 years for which data are available at the time of PDD submission, if or,

• the year in which project generation occurs, if EFOM,y is updated based on ex-post monitoring.

The choice between ex-ante and ex-post vintage should be specified in the PDD, and cannot be changed during the crediting period.

For the calculation of the Operating Margin (OM) Option 2 is chosen, by which the OM emission factor will be updated annually ex-post for the year in which actual project generation and associated emissions reductions occur.

However, the ax-ante approach was used for the calculation of indicative operating margin. The table 4 presents all the power plants included in the operating margin. If hydro, geothermal, wind, low-cost biomass, nuclear and solar generation are excluded, then only three thermal power plants remain for the adjusted operating margin: Yerevan, Hrazdan and Vanadzor TPPs. It must be noted that Vanadzor TPP has not been running since 2001.

The imports from Iran and Artsach region are also included in the calculation of the operating margin. The emission factor of all the imports was assumed in a conservative manner to be 0 tons of CO_2 per MWh (as prescribed on page 4 of the ACM0002 version 6 methodology).

The power sources included in the operating margin calculation are underlined in yellow in the table below.

Table 4

Name	Fuel	Capacity, MWh	Generation (2005),GWh	Contribution to total energy mix (2005), %	Contribution to the Operating Margin (2005), %
International Energy Corporation	Hydro	556	519,2	7,8	
Hrazdan TPP	Gas	1110	1435,5	21,6	66,3
Yerevan TPP	Gas	550	391,7	5,9	18,1
Vorotan Cascade	Hydro	400	1027,6	15,4	
Vanadzor TPP	Gas	96	0,0	0,0	0,0
Dzora SHPP	Hydro	25	70,0	1,1	
Small SHPPs[2]	Hydro	51	155,8	2,3	
ANPP	Nuclear	880	2716,3	40,8	
Imports			337,6	5,1	15,6

Choice of power plants for the calculation of the Build Margin (OM).

Taking into consideration the fact that most of the generation facilities and their equipment (more than 5%) are very old, the majority of those being constructed during the mid-soviet period, and the fact that the new generation units are under construction at the Hrazdan TPP and the Yerevan TPP and about 40 new small HPPs has got licenses for construction, the power generation mix will be significantly changing in the nearest future. Thus it makes sense to calculate the build margin in the year, in which

[2] Electric energy generated by the Lori-1 wind power plant is included in this category

project generation occurs, calculating the emission factor based on the ex-post monitoring during the crediting period.

It must be noted that generation and capacity data are unavailable for each of the small hydro power plants that contribute to 27.35 MW to the 51 MW capacity and are labelled under category "Other small Hydro Power Plants". All small hydro power plants were therefore considered as one category and the year of commissioning of the last of the small hydro power plants (2004) was used as the year of commissioning of the whole group.

The build margin can be calculated as the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently or as the five power plants that have been built most recently. As the sample group which will consist of the five most recently built power plants is unknown at the moment of PDD submission, it is assumed that the generation of the power plant capacity additions in the electricity system which will comprise 20% of the system generation will comprise larger annual generation. Thus, the plants that constitute the newest 20% of the system generation comprise hydro and thermal power plants and correspond to 1,455.9 MWh. The choice of plants for the build margin

calculation is highlighted in yellow in the table below. The highlighted plants contribute to 19.25% of total expected generation.

The data necessary for ex-post calculation is publicly available in Armenia and can be provided by PSRC upon request. The current data on Armenian power plants will be used prior to the point at which the first new plant will be added to the grid and start producing electricity. Each month the project proponent will update the information on newly constructed and commissioned power plants with the PSRC and recalculate emission factor.

According to the information provided by PSRC the future capacity additions will be as presented in the Table 5.[3]

Table 5. Future Capacity Additions

Power plants	Fuel	Commissioning date	Capacity	Generation	Contribution to total energy mix of the capacity additions
Exisiting Plants			**MW**	**GWh**	**(%)**
				2005 Generation	
Gerger	Hydro	1996	1,26	3,8	0,26
Yerevan reservoir 1	Hydro	1997	0,75	2,3	0,16

[3] The power plants which have licenses for construction

Kotayk canal	Hydro	2000	2,20	6,7	0,46
Yeghegis	Hydro	2004	6,40	19,6	1,35
Other SHPPs	Hydro	2004	27,35	83,6	5,74
New Plants				**Expected Generation**	
Talin	Hydro	obtained license	5,14	28,4	1,95
Chichan	Hydro	obtained license	0,6	0,4	0,03
Apres	Hydro	obtained license	1,5	11,7	0,80
Hermon	Hydro	obtained license	1,2	4,1	0,28
Getik-1	Hydro	obtained license	6,5	21,1	1,45
Getik-2	Hydro	obtained license	0,9	4,3	0,30
Aghstev-6	Hydro	obtained license	6,52	16,8	1,15
Meghri	Hydro	obtained license	2	11,5	0,79
Pambak	Hydro	obtained license	21	79,2	5,44
Bovadzor	Hydro	obtained license	0,38	1,8	0,12
Manushakadzor	Hydro	obtained license	0,35	1,433	0,10
Kurtan-1	Hydro	obtained license	0,67	2,9	0,20
Kurtan-2	Hydro	obtained license	5,2	17	1,17
Ayri	Hydro	obtained license	1,1	4,6	0,32
Argichi	Hydro	obtained license	8,6	29,1	2,00
Rine	Hydro	obtained license	0,09	0,8	0,05
Tatev	Hydro	obtained license	2,35	13	0,89
Eghvard	Hydro	obtained license	0,9	4	0,27
Spitak-1	Hydro	obtained license	0,5	2,3	0,16
Chanachchi	Hydro	obtained license	1,4	6,2	0,43
Jradzor	Hydro	obtained license	5..93	20.0	1,19
Hoktember	Hydro	obtained license	0,06	0,5	0,03
Ler Eks-1	Hydro	obtained license	0,28	2,4	0,16
Ler Eks-2	Hydro	obtained license	0,25	2,2	0,15
Ler Eks-3	Hydro	obtained license	0,37	2,7	0,19
Ler Eks-4	Hydro	obtained license	0,23	1,8	0,12
Ler Eks-5	Hydro	obtained license	0,24	1,8	0,12
Ler Eks-6	Hydro	obtained license	0,34	2,6	0,18
Vahagni	Hydro	obtained license	1	8	0,55
Sandaghbyur	Hydro	obtained license	0,66	2,4	0,16
Dzor-Dzor	Hydro	obtained license	0,3	1,8	0,12
Elegis-1 (retrofit)	Hydro	obtained license	3,16	5,3	0,36
Amasia	Hydro	obtained license	0,9	1	0,07
Sisakan	Hydro	obtained license	0,5	1,9	0,13
Eghvard-2	Hydro	obtained license	9,31	18,2	1,25
Geghi-1	Hydro	obtained license	4,09	15,4	1,06
Haghpat-1	Hydro	obtained license	0,32	1,05	0,07
Haghpat-2	Hydro	obtained license	1,9	8,09	0,56
Aygezard	Hydro	obtained license	0,84	3,32	0,23
Saravan	Hydro	obtained license	2,488	7,7	0,53
Aghstev-1	Hydro	obtained license	3,6	14,4	0,99
Jermuk-2	Hydro	obtained license	2,35	10,2	0,70

Gevorgavan	Hydro	obtained license	0,06	0,32	0,02
Pambak-1	Hydro	obtained license	1,91	13,9	0,95
Tej	Hydro	obtained license	2,26	7,01	0,48
Ajgedzor-2	Hydro	obtained license	2	6	0,41
Hnevank-1	Hydro	obtained license	0,967	5,75	0,39
Hnevank-2	Hydro	obtained license	0,5	2,7	0,19
Hrazdan TPP Unit-5	Natural gas	obtained license	400	717,75	49,30
Yerevan TPP New Unit	Natural gas	obtained license	215,00	195,85	13,45
				1455,973	**100**

B.6.2. Data and parameters that are available at validation:

(Copy this table for each data and parameter)

Data / Parameter:	**CO_2 operating margin emission factor of the grid**
Data unit:	kg CO_2/kWh
Description:	The CO_2 operating margin emission factor is calculated according to the simple adjusted operating margin methodology detailed in Section B.6.3. and B.6.4.
Source of data used:	• Public Service Regulatory Commission of Armenia, which provided the following data: - the total electricity generation of Armenian power plants - the type of fuels consumed in 2005, quantity of the fuel and power (energy own consumption) consumed by the Thermal Power plants • Government of Armenia, which adopted the "Energy Sector Development Strategies in the Context of Economic Development in Armenia", August 2005 and which includes information on Armenian policies in the energy sector and fully describes the existing plants' operations (sub-units, commissioning dates, total electric capacity etc.)
Value applied:	0.535
Justification of the choice of data or description of measurement methods and procedures actually applied :	The justification for using the adjusted operating margin method is presented in Section B.6.1. The actual steps of the calculation are detailed in Section B.6.3. and B.6.4.
Any comment:	

Data / Parameter:	**CO_2 build margin of the grid**
Data unit:	kg CO_2/kWh
Description:	The CO_2 build margin emission factor is calculated according to the simple adjusted operating margin methodology detailed in Section B.6.3. and B.6.4.
Source of data used:	• Public Service Regulatory Commission of Armenia, which provided information on future capacity additions in the grid
Value applied:	0.398
Justification of the	The justification for using the adjusted operating margin method is presented in

choice of data or description of measurement methods and procedures actually applied :	Section B.6.1. The actual steps of the calculation are detailed in Section B.6.3. and B.6.4.
Any comment:	

Data / Parameter:	**Fuel consumption in thermal power plants**
Data unit:	g_{eqv}/kWhe
Description:	The quantity of fuel consumed in thermal power plants for the electricity generation
Source of data used:	Public Service Regulatory Commission of Armenia
Value applied:	0,385 kg_{ce}/kWh in Hrazdan TPP 0,398 kg_{ce}/kWh in Yerevan TPP
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data were provided by PSRC, based on the statistical information provided by thermal power plants.
Any comment:	kg_{ce} – kilogram of coal equivalent, reference unit for the energetic evaluation of various energy carriers. 1 kg coal equivalent corresponds to a value specified as 7,000 kilocalories (7,000 kcal ~ 29.3 MJ ~ 8.141 kWh).

Data / Parameter:	**CO_2 emission coefficient of each fuel type**
Data unit:	tC/TJ
Description:	The CO2 emission coefficient of a fuel type is the carbon content of each fuel type, adjusted by the combustion efficiency factor (or oxidation factor) of 0.995
Source of data used:	Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. Workbook, Vol. 2., Table 1-2, page 1.6 (http://www.ipccnggip.iges.or.jp/public/gl/guidelin/ch1wb1.pdf)
Value applied:	Natural gas (dry), adjusted: 15.22 Nuclear: 0 Hydro: 0
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data given by the IPCC is considered to be authoritative in this field.

Any comment:	

Data / Parameter:	**Electricity generation of each power plant**
Data unit:	GWh
Description:	The amount of electricity generated by each power plant in the grid
Source of data used:	PSRC
Value applied:	See table 4
Justification of the choice of data or description of measurement methods and procedures actually applied :	The aforementioned information represents the most accurate data on electricity generation level in 2005 from all existing generation facilities supplying the electric grid of Armenia. The aforementioned information was used during the calculation of the adjusted operation margin.
Any comment:	

Data / Parameter:	**Identification of power plants for the OM**
Data unit:	Name of the plant
Description:	The methodology ACM0002 provides for options for the calculation of operating margin. The adjusted simple operating margin was chosen for this CDM project.
Source of data used:	PSRC
Value applied:	Hrazdan TPP, Yerevan TPP, Vanadzor TPP
Justification of the choice of data or description of measurement methods and procedures actually applied :	The calculation of the adjusted operating margin implies the division of generation sources in low cost must run resources (hydro, geothermal, wind, low-cost biomass, nuclear and solar generation) and other resources. If the low-cost must-run resources are excluded, then only three thermal power plants can be included in the calculation of the adjusted operating margin
Any comment:	

Data / Parameter:	**Lambda Factor of the grid**
Data unit:	
Description:	**Fraction of time during which low-cost / must run sources are on the margin**
Source of data used:	PSRC
Value applied:	The Energy Strategy Center has provided project proponent with the data necessary for plotting the Load Duration Curve and estimating the factor lambda for the year 2005 for the Armenian electricity grid.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The calculation of the adjusted operating margin implies the division of generation sources in low cost must run resources (hydro, geothermal, wind, low-cost biomass, nuclear and solar generation) and other resources. If the low-cost must-run resources are excluded, then only three thermal power plants can be included in the calculation of the adjusted operating margin
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

In the current section the derivation of baseline emission coefficient is presented.

AMS I.D. (Version 12) offers the following the following choices for the preparing the baseline calculation for this type of project activity:

a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002. Any of the four procedures to calculate the operating margin can be chosen, but the restrictions to use the Simple OM and the Average OM calculations must be considered.

OR

(b) The weighted average emissions (in kg CO2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

Option a) was used

Step 1. Calculate the simple adjusted operating margin (see Annex 3).

a. Contribution to the total thermal power produced in the grid. (%)

Data source: PSRC - 2005

Percentage contribution	**=**	**Generation in 2005, including imports (MWh)**	**/**	**Total thermal generation in 2005 (MWh)**

b. Determine each plant's heat rate (MJ/MWh)

Plant heat rate	**=**	**Plant's fuel consumption,**	**X**	**7000[4] (kcal/kgce)**	**X**	**4.1868 (MJ/kcal)**

[4] kg_{ce} – kilogram of coal equivalent, reference unit for the energetic evaluation of various energy carriers. 1 kg coal equivalent corresponds to a value specified as 7,000 kilocalories (7,000 kcal ~ 29.3 MJ ~ 8.141 kWh)

(MJ/MWh)	**including auxiliary consumption (kg_{ce}/kWh)**	

Data Source: fuel consumption and auxiliary consumption in thermal power plants, PSRC

c. Estimated carbon content (adjusted) of each type of the fuel (tons of C/TJ)

Carbon content (adjusted) of each fuel (tons of carbon/TJ)	**=**	**Carbon content of each fuel (tons of carbon/TJ)**	**X** **Combustion efficiency of each plant (%)**

Data Source: Carbon content (unadjusted) & combustion efficiency: WB GHG Assessment Handbook
PDD of Yeghegis Small Hydro Power Plant published on UNFCCC website

d. Emission factor of each power plant (specific to each fuel consumed) (kgC/MWh):

Emission factor of each power plant (specific to each fuel consumed) (kgC/MWh)	**=**	**Heat Rate (MJ/MWh)**	**X** **Carbon content (adjusted) / 10^3 of each fuel (tons of Carbon/TJ)**

e. Emission factor converted into CO_{2equ} (specific to each fuel consumed) (kg CO_2/kWh):

CO_{2equ} emissions of each power plant (kg CO_2/kWh)	**=**	**Emission factor of each power plant (specifict to each fuel consumed) (kg C/MWh)**	**X** **(44/12) / 10^3**

f. Weighted average emissions of each power plant (specific to each fuel consumed):

Weighted CO_{2equ} emissions of each plant for every kWh in the grid (kg CO_2/every kWh in the grid)	**=**	**CO_{2equ} emissions of each plant**	**X** **Percentage contribution to the grid in 2005**

g. Calculate the operating margin for 2005

Operating margin (kgCO2equ/kWh)	**=**	**Sum of weighted CO2equ emissions of each plant for every kWh in the grid (kg CO2/kWh)**

h. Calculate λ for 2005

λ = number of hours per year for which low - cost/must run sources are on margin / 8760 hours per year

i. Apply (1-λ) to the operating margin

Simple adjusted operating margin = (1-λ) X Operating margin (kg CO_{2equ}/kWh

Step 2: Calculate the emission factor of each plant and develop the build margin (See Annex 3).

Build Margin (kg CO_{2equ}/kWH) = Sum of weighted CO2equ emissions of each plant for every kWh in the grid generated by the 20% newest plants (kg CO_{2equ}/kWH)

Step 3: Calculate the baseline emission factor of the grid (see Annex 3)

Emission coefficient of the grid (kg CO_{2equ}/kWh) = Build Margin (kg CO_{2equ}/kWh) + Simple Adjusted Operating Margin (kg CO_{2equ}/kWh) /2

Step 4: Calculate the baseline emissions of the project activity (see Annex 3)

Baseline emission of the project (tons of CO_2) = Electricity generation in Jradzor SHPP over 10 years crediting period X Emssion coefficient of the grid (kg CO_{2equ}/kWh) /10^3

Emissions from leakage are not considered, since the energy generating equipment will not be transferred from another activity.

B.6.4 Summary of the ex-ante estimation of emission reductions:

Year	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of project activity emission reductions (tonnes of CO_2e)	Estimation of Leakage (tonnes of CO_2e)	Estimation of emission reductions (tonnes of CO_2e)
Year 1	8 734	0	0	8 734
Year 2	8 734	0	0	8 734

Year 3	8 734	0	0	8 734
Year 4	8 734	0	0	8 734
Year 5	8 734	0	0	8 734
Year 6	8 734	0	0	8 734
Year 7	8 734	0	0	8 734
Year 8	8 734	0	0	8 734
Year 9	8 734	0	0	8 734
Year 10	8 734	0	0	8 734
Total (tonnes of CO2)	**87 340**	**0**	**0**	**87 340**

B.7 Application of a monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)	
Data / Parameter:	**Electricity supplied to the grid**
Data unit:	MWh
Description:	Electricity supplied to the grid by the Jradzor SHPP
Source of data to be used:	The electric meter installed in Jradzor SHPP will measure the electricity supplied to the grid.
Value of data	The projected electricity generation by Jradzor SHPP is presented in the section A.4
Description of measurement methods and procedures to be applied:	For the monitoring of electricity generation inspected and certified (according to national regulations) monitoring equipment (electric meter) will be installed in place. The data will be monitored and recorded by qualified engineers according to the monitoring plan. Electric meter readings will be double-checked with the records of the AEN.
QA/QC procedures to be applied:	The Hydro Corporation will appoint a designated engineer on site who will be responsible for collecting and compiling the necessary data for the monitoring plan. The data will be collected in a transparent way and provided to the third party audit entity for the DOE validation and certification.
Any comment:	

Data / Parameter:	**Identification of power source plant for the BM**
Data unit:	Name of plant
Description:	The build margin includes either the newest five power plants or newest power plants that have been built more recently and contributed to 20% of electricity generation of a certain year, whichever definition includes the largest

	generation.
Source of data to be used:	PSRC
Value of data	The names of the plants currently included in the build margin are detailed in Section B.6.1. The names of plants to be included in the build margin will be determined annually ex-post.
Description of measurement methods and procedures to be applied:	The names of plants to be included in the build margin will be determined annually ex-post.. The data on the plants to be included in the Build margin is available in Armenia and can be provided by PSRC upon request. The current data on Armenian power plants will be used prior to the point at which the first new plant will be added to the grid and start producing electricity. Each month the project proponent will update the information on newly constructed and commissioned power plants with the PSRC and recalculate emission factor.
Any comment:	

Data / Parameter:	**Identification of power source plants for the OM**
Data unit:	Name of plant
Description:	The power plants to be included in the operating margin will be identified as it is detailed in the section B.4 and B.6.
Source of data to be used:	PSRC
Value of data	The names of the plants currently included in the operating margin are detailed in Section B.6.1. The names of plants to be included in the operating margin will be determined annually ex post.
Description of measurement methods and procedures to be applied:	The names of plants to be included in the operating margin will be determined annually ex-post. The data on the plants to be included in the Operating margin is available in Armenia and can be provided by PSRC upon request. The current data on Armenian power plants will be used prior to the point at which the first new plant will be added to the grid and start producing electricity. Each month the project proponent will update the information on newly constructed and commissioned power plants with the PSRC and recalculate emission factor.
Any comment:	

Data / Parameter:	**CO_2 operating margin of the grid**
Data unit:	kgCO2/kWh
Description:	Calculated as the weighted emission factor of all the power plants included in the operating margin.
Source of data to be used:	PSRC
Value of data	0.535
Description of	The detailed calculations of the emission factor of the electricity grid are

measurement methods and procedures to be applied:	presented in the section B.6.3 and can be checked by the DOE.
Any comment:	

Data / Parameter:	**CO_2 build margin of the grid**
Data unit:	kgCO2/kWh
Description:	Calculated as the weighted emission factor of all the power plants included in the build margin.
Source of data to be used:	PSRC
Value of data	0.398
Description of measurement methods and procedures to be applied:	The detailed calculations of the emission factor of the electricity grid are presented in the section B.6.3 and can be checked by the DOE.
Any comment:	

Data / Parameter:	**CO_2 emission factor of the grid**
Data unit:	kgCO2/kWh
Description:	Calculated as the average of the Operating Margin emission factor and the Build Margin emission factor
Source of data to be used:	PSRC Government of RA Energy Strategy Center
Value of data	**0,437**
Description of measurement methods and procedures to be applied:	The detailed calculations of the emission factor of the electricity grid are presented in the section B.6.3 and can be checked by the DOE.
Any comment:	

Data / Parameter:	**Lambda factor of the grid**
Data unit:	
Description:	Fraction of time during which low-cost / must run sources are on the Margin.
Source of data to be used:	PSRC Energy Strategy Center
Value of data	**0.11**
Description of measurement methods	The detailed calculations of the emission factor of the electricity grid are presented in the section B.6.3 and can be checked by the DOE.

and procedures to be applied:	
Any comment:	

B.7.2 Description of the monitoring plan:

Name: **Monitoring methodology for Project activity I.D "Grid connected renewable electricity generation"**
Reference: Article 9 Type I.D. **Appendix B of the simplified modalities and procedures for small-scale CDM project activities.**

The project activity is generation of electricity for a grid system using water potential. Hence, the type and category of the project activity matches with I.D. as specified in Appendix B of the indicative simplified baseline and monitoring methodologies for small-scale CDM project activities.

Ani OJSC will appoint a designated engineer on site who will be responsible for collecting and compiling the necessary data for the monitoring plan. The data will be collected in a transparent way and provided to the third party audit entity for the DOE validation and certification.

No leakage is expected.

For the monitoring of electricity generation inspected and certified (according to national regulations) monitoring equipment (electric meter) will be installed in place. The data will be monitored and recorded by qualified engineers according to the monitoring plan. Electric meter readings will be double-checked with the records of the AEN. The data will be electronically archived. Receipts of electricity sales will be obtained. The rest of the data to be monitored for the emission factor calculation will be obtained from the Public Services Regulatory Commission of RA.

The Director of Ani OJSC - Mr. Gevorg Manukyan will be responsible for the full implementation of the monitoring methodology outlined in the PDD for their respective

ID number	Data Type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived (electronic/paper)	For how long data to be kept?	Comment
D.3.1	Electricity generation	Electricity supplied to the grid by the project	MWh	M	Hourly	100%	Electronic and paper	During the credit period + two years	
D.3.2	CO_2 emission factor	CO_2 emission factor of the grid	t CO_2/MWh	C	Monthly	100%	Electronic and paper	During the credit period + two years	
D.3.3	Min. water flow in the river	Minimum water flow in the river for ecological reasons	m^3/sec	M	Daily	100%	Electronic and paper	During the credit period + two years	
D.3.4	CO_2 Build Margin emission factor	CO_2 build margin emission factor of the grid	t CO_2/MWh	C	Monthly	100%	Electronic and paper	During the credit period + two years	
D.3.5	CO_2 Operating Margin emission factor	CO_2 operating margin emission factor of the grid	t CO_2/MWh	C	Monthly	100%	Electronic and paper	During the credit period + two years	
D.3.6	Lambda	Lambda		C	Monthly	100%	Electronic and paper	During the credit	

	factor	factor of the grid						period + two years	

B.8 Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)

Date of completing the final draft of the baseline and monitoring methodology:
August 2007
Name of person/entity determining the baseline and monitoring methodology:
Mr. Karen Arabyan
Energocor Ltd
k.arabyan@energocor.am

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

01.06.2006

C.1.2. Expected operational lifetime of the project activity:

30 years

C.2 Choice of the crediting period and related information:

The project activity has chosen a fixed ten-year crediting period

C.2.1. Renewable crediting period

N/A

C.2.1.1. Starting date of the first crediting period:

N/A

C.2.1.2. Length of the first crediting period:

N/A

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

30.11.2008

C.2.2.2. Length:

CDM – Executive Board

10 years

SECTION D. Environmental impacts

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

All power generation projects carried out in Armenia are required to conduct an environmental impact assessment in conformity with Order on Environmental Protection. The Jradzor SHPP will be constructed on the existing irrigation canal of river Akhuryan, so no negative environmental impact on biodiversity, fishery or water quantity is expected. Moreover, the project does not envisage construction of reservoir and thus, avoids submersion of adjacent territory as well as emission of CH4 associated with stagnation of water in the reservoir. Furthermore, since the project utilizes environmentally save technologies, it does not result in degradation of any natural resources, health standards or water quality. Project realization does not involve any detrimental effect on forestry since there is no natural forestry at the construction site.

The Ministry of Environmental Protection has approved the Jradzor project on 09.06.2006. The design solutions of Jradzor hydro plant, the impact of the planned construction works and operation on the environment and social-economic consequences were studied and evaluated in accordance with the legislative requirements. No negative environmental impacts were identified. The only issue identified was:

«When reissuing water permit it is necessary to take into consideration the amount of water required for fire prevention».

The Ministry of Environmental Protection has approved the Jradzor project on 09.06.2006. The design solutions of Jradzor hydro plant, the impact of the planned construction works and operation on the environment and social-economic consequences were studied and evaluated in accordance with the legislative requirements. No negative environmental impacts were identified. The only issue identified was:

«When reissuing water permit it is necessary to take into consideration the amount of water required for fire prevention».

According to the procedures for the operation of SHPP, the Company has to reissue water permit with the indication of the amount of water required for the operation of SHPP. The completion of the construction of SHPP is expected in August 2008. After that, the Company will calculate the amount of water required for the fire prevention purposes and will add that to the water quantity necessary for the operation of the

SHPP, after which they will apply for the new water permit. In addition, a small water storage reservoir will be constructed on site in order to meet fire prevention requirements. The Company will inform Ministry of Nature Protection about fulfillments of the aforementioned requirement.

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

N/A

SECTION E. Stakeholders' comments

E.1. Brief description how comments by local stakeholders have been invited and compiled:

Local stakeholders' comments were received during the licensing process and conducting the environmental impact assessment.

The procedure for obtaining a license for construction of HPP in Armenia requires conducting a public hearing. Prior to issuance of the license the PSRC publishes a request for comments from all the stakeholders in local newspapers. Besides, it is required to submit project documentation to local communities for the comments. During the Environmental Impact Assessment the Ministry of Nature Protection submits the project documentation to NGO's

Comments from the local stakeholders were received during the procedures of obtaining the license, switching the land categories and the Environmental Impact Assessment. The company has received positive comments and decisions from local and state government bodies, communities and NGOs. Besides, on 15.12.2005 the Company has developed Project Idea Note which was submitted to the Ministry of Nature Protection (DNA) and the PIN was approved on 26.01.2006.

Environmental Impact Assessment was conducted in June, 2006 and Ministry Of Nature Protection approved the Project.

E.2. Summary of the comments received:

No major concern was raised during the public hearing.

E.3. Report on how due account was taken of any comments received:

No major concern was raised during the public hearing.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	"ANI" OJSC
Street/P.O.Box:	
Building:	
City:	Noraber
State/Region:	Shirak Marz
Postfix/ZIP:	
Country:	Republic of Armenia
Telephone:	+374 10 720 173
FAX:	+374 10 720 173
E-Mail:	aniojsc@mail.ru
URL:	
Represented by:	
Title:	Mr.
Salutation:	Director
Last Name:	Manukyan
Middle Name:	
First Name:	Gevorg
Department:	Management
Mobile:	+374 91 417 136
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Total funding required for the project does not include any public funding from Annex I countries.
Hence, the project proponents hereby confirm that public funding from parties included in Annex - I is not involved in the project activity

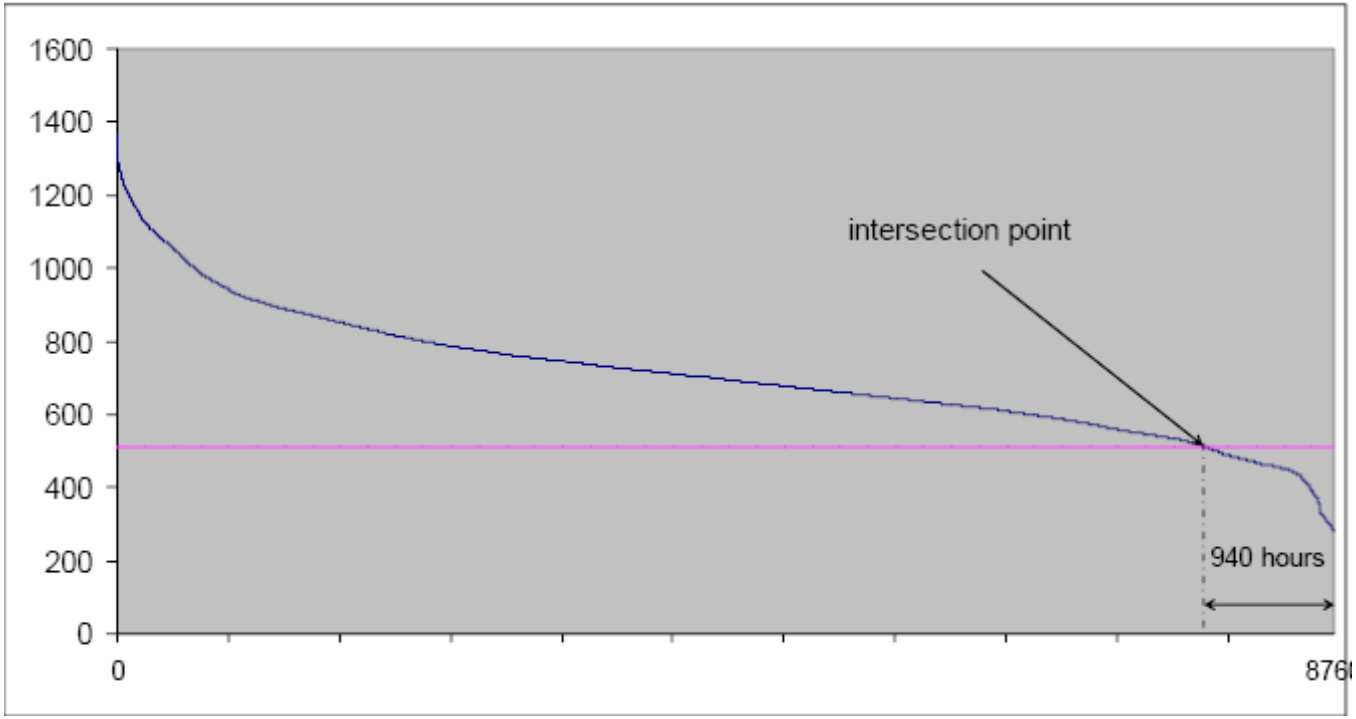
Annex 3

BASELINE INFORMATION

Step 1. The table below calculates the relative energy contribution of each of the thermal plant connected to the grid, calculates the emission factor of each plant and develops the future simple operating margin .

			A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	International Energy Corporation	Hydro	556	519,2	7,8											
2	Hrazdan TPP	Gas	1110	1435,5	21,6	1435,5	66,31%	0,385	11277,564	15,300	0,995	15,224	171,684	0,630	0,417	
3	Yerevan TPP	Gas	550	391,7	5,9	391,7	18,09%	0,398	11658,563	15,300	0,995	15,224	177,484	0,651	0,118	
4	Vorotan Cascade	Hydro	400	1027,6	15,4											
5	Vanadzor TPP	Gas	96	0	0,0	0	0									
6	Dzora SHPP	Hydro	25	70	1,1											
7	Small SHPPs	Hydro	51	155,8	2,3											
8	ANPP	Nuclear	880	2716,3	40,8											
9	Imports			337,6	5,1	337,6	15,59%	0,000	0,000	15,300	0,995	15,224	0,000	0,000	0,000	
	Total			**6653,7**		**2164,8**										**0,535**
Sources	Energy Sector Development Strategies in the Context of Economic Development in Armenia, Public Services Regulating Commission of RA (PSRC)	PSRC	Energy Sector Development Strategies in the Context of Economic Development in Armenia, PSRC	PSRC, Energy Sector Development Strategies in the Context of Economic Development in Armenia, Public Services Regulating Commission	Calculated			PSRC	Calculated F X 4,1868 X 7000	GHG Assesment Handbook: World Bank	GHG Assesment Handbook: World Bank	Calculated: (H x I)	Calculated: G x J/10^3	Calculated : K x (44/12)/(10^3)	Calculated : E x H	Calculated: Sum of all in N

Calculation of lambda.
The number of hours for which low-cost/must-run sources are on the margin for 2005 =940 (See figure below).



Lambda for 2005 = 940/8760=0.11

Step 2: The table below calculates the emission factor of each plant included in the build margin and develops the build margin

Power plants	Fuel	Commissioning date	Capacity	Generation	Contribution to total energy mix of the capacity additions	Emission factor	Weighted average	Build margin
Exisiting Plants			**MW**	**GWh**	**(%)**	**kg CO2/kWh**	**kg CO2/kWh**	**kg CO2/kWh**
				2005 Generation				
Gerger	Hydro	1996	1,26	3,8	0,26	0	0	0
Yerevan reservoir 1	Hydro	1997	0,75	2,3	0,16	0	0	0
Kotayk canal	Hydro	2000	2,20	6,7	0,46	0	0	0
Yeghegis	Hydro	2004	6,40	19,6	1,34	0	0	0
Other SHPPs	Hydro	2004	27,35	83,6	5,73	0	0	0
New Plants				**Expected Generation**				
Talin	Hydro	obtained license	5,14	28,4	1,95	0	0	
Chichan	Hydro	obtained license	0,6	0,4	0,03	0	0	0
Apres	Hydro	obtained license	1,5	11,7	0,80	0	0	0
Hermon	Hydro	obtained license	1,2	4,1	0,28	0	0	0
Getik-1	Hydro	obtained license	6,5	21,1	1,45	0	0	0
Getik-2	Hydro	obtained license	0,9	4,3	0,29	0	0	0
Aghstev-6	Hydro	obtained license	6,52	16,8	1,15	0	0	0
Meghri	Hydro	obtained license	2	11,5	0,79	0	0	0
Pambak	Hydro	obtained license	21	79,2	5,43	0	0	0
Bovadzor	Hydro	obtained license	0,38	1,8	0,12	0	0	0
Manushakadzor	Hydro	obtained license	0,35	1,433	0,10	0	0	0
Kurtan-1	Hydro	obtained license	0,67	2,9	0,20	0	0	0
Kurtan-2	Hydro	obtained license	5,2	17	1,17	0	0	0
Ayri	Hydro	obtained license	1,1	4,6	0,32	0	0	0
Argichi	Hydro	obtained license	8,6	29,1	1,99	0	0	0
Rine	Hydro	obtained license	0,09	0,8	0,05	0	0	0
Tatev	Hydro	obtained license	2,35	13	0,89	0	0	0
Eghvard	Hydro	obtained license	0,9	4	0,27	0	0	0
Spitak-1	Hydro	obtained license	0,5	2,3	0,16	0	0	0
Chanachchi	Hydro	obtained license	1,4	6,2	0,43	0	0	0
Jradzor	Hydro	obtained license	5,93	20	1,37	0	0	0
Hoktember	Hydro	obtained license	0,06	0,5	0,03	0	0	0
Ler Eks-1	Hydro	obtained license	0,28	2,4	0,16	0	0	0
Ler Eks-2	Hydro	obtained license	0,25	2,2	0,15	0	0	0
Ler Eks-3	Hydro	obtained license	0,37	2,7	0,19	0	0	0
Ler Eks-4	Hydro	obtained license	0,23	1,8	0,12	0	0	0
Ler Eks-5	Hydro	obtained license	0,24	1,8	0,12	0	0	0
Ler Eks-6	Hydro	obtained license	0,34	2,6	0,18	0	0	0
Vahagni	Hydro	obtained license	1	8	0,55	0	0	0
Sandaghbyur	Hydro	obtained license	0,66	2,4	0,16	0	0	0
Dzor-Dzor	Hydro	obtained license	0,3	1,8	0,12	0	0	0
Elegis-1 (retrofit)	Hydro	obtained license	3,16	5,3	0,36	0	0	0
Amasia	Hydro	obtained license	0,9	1	0,07	0	0	0
Sisakan	Hydro	obtained license	0,5	1,9	0,13	0	0	0
Eghvard-2	Hydro	obtained license	9,31	18,2	1,25	0	0	0
Geghi-1	Hydro	obtained license	4,09	15,4	1,06	0	0	0
Haghpat-1	Hydro	obtained license	0,32	1,05	0,07	0	0	0
Haghpat-2	Hydro	obtained license	1,9	8,09	0,55	0	0	0
Aygezard	Hydro	obtained license	0,84	3,32	0,23	0	0	0
Saravan	Hydro	obtained license	2,488	7,7	0,53	0	0	0
Aghstev-1	Hydro	obtained license	3,6	14,4	0,99	0	0	0
Jermuk-2	Hydro	obtained license	2,35	10,2	0,70	0	0	0
Gevorgavan	Hydro	obtained license	0,06	0,32	0,02	0	0	0
Pambak-1	Hydro	obtained license	1,91	13,9	0,95	0	0	0
Tej	Hydro	obtained license	2,26	7,01	0,48	0	0	0
Ajgedzor-2	Hydro	obtained license	2	6	0,41	0	0	0
Hnevank-1	Hydro	obtained license	0,967	5,75	0,39	0	0	0
Hnevank-2	Hydro	obtained license	0,5	2,7	0,19	0	0	0
Hrazdan TPP Unit-5	Natural gas	obtained license	400	717,75	49,21	0,62950801	0,310	
Yerevan TPP New Unit	Natural gas	obtained license	215,00	195,85	13,43	0,650775173	0,087	
				1458,673	**100**		**BM**	**0,397**
PSRC and PDD of Yeghegis SHPP published on UNFCCC website	PSRC	PSRC	Energy Sector Development Strategies in the Context of Economic Development in Armenia,	PSRC	Calculated	Calculated in the OM table	Calculated: contribution to total energy mix times to the emission factor	Calculated: Sum of weighted average emissions

Step 3: The table below calculated the emission factor of the grid

Operating margin	Lambda	Adjusted Operating Margin	Build Margin	Emission factor of the grid
0,53518449	0,11	0,476	0,397	0,437

Calculating emission reductions: **The table below calculates the baseline**

Year	Annual generation	Estimation of emission reductions (tones of CO2)
2008	20.0	8 734
2009	20.0	8 734
2010	20.0	8 734
2011	20.0	8 734
2012	20.0	8 734
2013	20.0	8 734
2014	20.0	8 734
2015	20.0	8 734
2016	20.0	8 734
2017	20.0	8 734
Total (tones of CO_2)		87 340

Annex 4

MONITORING INFORMATION

All monitoring information is contained in section B.7

- - - - - - - - - -