COMPONENT PROJECT ACTIVITIES DESIGN DOCUMENT (CPA-DD)

SECTION A. General description of CPA

A.1. Title of the proposed or registered PoA

Title: Small Hydropower Programme of Activities in Armenia
Version: 03

A.2. Title of the CPA

Title: Small Hydropower Programme of Activities in Armenia – Sedvi 1 + 2 Hydropower Project”
Version: 03
Date: 25/12/2012

A.3. Description of the CPA

Sedvi Energo LLC as the Component Project Activity (CPA) implementer is proposing to implement a component project activity named “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project”, in Armenia.

The proposed component CDM project activity “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” is developed as part of the “Small Hydropower Programme of Activities in Armenia”. The coordinating/managing entity (CME) of the PoA is Energy Changes GmbH from Austria.

The primary objective of the PoA is the generation of electricity by utilizing the hydropower potential in the region. The electricity generated through the project activity will be supplied to the Armenian national electricity grid, will replace the grid electricity and thus it will reduce greenhouse gas emissions.

Technology/measure implemented by the CPA:

In accordance with the PoA “Small Hydro Power Programme of Activities in Armenia”, the proposed CPA involves construction of

- A new renewable power plant – hydro power plant where no renewable power plant was before, (greenfield power plant), which is
- located in Katchatchkut community (Sedvi 1) and Aqori community (Sedvi 2) respectively, in Armenia,
- consists of one hydro power unit each in the run-of-river hydro power plant with hydro power turbine technology for the generation of electricity,
- has total installed capacity of 1.183 (0.377 (Sedvi 1) + 0.806 (Sedvi 2)) and is
- supplying the generated electricity to the Armenian national electricity grid.

Sustainable development:

The component project activity will

- replace a part of the grid electricity generated mostly from fossil-fuel and thereby reducing the CO₂ emissions and emissions of other pollutants. Approximately 1,754 tCO₂ will be reduced per year,
- implement clean, renewable and sustainable energy source in Armenia, create local employment opportunities during construction of the SHPP and during the operation.
A.4. Entity/individual responsible for CPA
>> The entity responsible of the CPA, hence forth referred to as CPA implementer, is

SEDVI ENERGO LLC
Kachachkut village
Lori Marz
Republic of Armenia

Due to the remote location, all mailings shall be made to:
SEDVI ENERGO LLC
7th Street, House 16,
Nork-Marash,
0047 Yerevan,
Republic of Armenia

Contact person is Mr. Sargis Gabayan

A.5. Technical description of the CPA

The SHPP Sedvi is located in the administrative area of Katchatchkut village at the Kachachkut River. It is a typical mountainous river with clearly expressed spring high water period and stable winter low water period. The summer low water, as a rule, begins in the second half of the summer and is lower than that of the winter. The feeding of the river is mixed: generated from the snowmelt, rainfalls and soil. The territory is of forest landscape zone type with brown ash free ground. The area foreseen for Sedvi SHPP is not used for agricultural purposes.

**Sedvi 1**
The water intake for the SHPP will be constructed 700m downstream from Katchatchkut village. For this purpose, a dam of 1.5 m height will be constructed on the river with the shore type intake and the possibility to take water directly from the river.

Sedvi-1 SHPP will use the pressure arising from the river points between 1,164 m and 990 m according to the project design. The SHPP has an installed capacity of 377 kW and a yearly average electricity production of 1,307.8 MWh. It utilizes a static pressure of 174.1 m and a calculated water flow of 300 l/s.

The structures of Sedvi-1 SHPP will be the following:
- Shore type water intake unit on the Katchatchkut river,
- One –chamber sedimentary,
- Iron penstock with the length of 1,000 m and the diameter of 400 mm,
- SHPP power house,
- Tail race channel,
- Transformer substation and transmission lines

**Headwork:**
It is envisaged to build a headwork structure of 1.5m height concrete spillover wall. The length of the wall will be 6m, and a shore type of intake will be built on the spillway. Due to topographic conditions the sedimentary will be separate from headwork and the water will be supplied through a small inlet channel. The settler will be composed of one chamber the bottom of which will have a longitudinal and a transverse incline.

The settler's chamber dimension for the given flow will be:
B=1.3m, L=9m, H=1.5m. The approximate volume of earthworks will be 92 m³, and the concrete works 24 m³ respectively. A stream fish pass with discharge of 6 l/s will be constructed on the right bank edge.

Pipeline:
A metallic diversion pipeline of 400mm diameter and of 910m length from the settler is proposed to be constructed. Pipeline route will go along 3m width shelf which will go along left side slope to power house. The Owner has received all required agreements. For installation of the pipeline it is proposed to implement a 3 to 4 m width platform along the left river bank.

Power House:
The power house will be built on a small land plot that belongs to the Owner. The following facilities will be located in the building:
1. Machine house
2. Auxiliary structures
As the SHPP will be fully automated no room is provided for operation staff. The total floor space of the constructed building will be 42 m². An overhead bridge crane will be provided in the building for installation and rehabilitation of the power unit. An open handling and installation platform will be arranged in front of the house. The plant’s building will be fenced.

Transformer substation and Transmission lines
It is proposed to install one 0.4/10kV transformer with a power of 600kVA. The substation will be of open type. For the safety purpose a wire mesh fence will be constructed around the transformer. The power lines of 10kV voltage and 1.8 km length will be connected to the State Power Network that runs through Alaverdi town.

Diversion channel
The diversion channel represents a rectangular reinforced concrete structure. It will remove water from the power unit to the settler of Sedvi 2 SHPP.

Installed turbine:
The average monthly minimum flows of SHPP amount to 12.9% to 13.3% of design flow (in December). In such conditions it is economically efficient to install a state of the art cross-flow turbines of European production (Osberger or Cink), which will provide constant operation of the plant even in case of low discharge.

Such turbines have wide application and are efficient within variety of flows. The efficiency ratio of such turbines under design flow reaches up to 86% and is maintained even if the actual flow makes up 17% of the design flow.

It is envisaged to install one fully automated hydro-power unit of cross-flow Cink (Czech production) turbine that will operate without operation staff. The SHPP is completely automated and requires only regular control for lubrication of bearings. It requires almost no maintenance costs and is implemented in over 9,800 power plants in 110 countries.

Monitoring:
Water discharge is controlled through the power generated at SHPP. The control will be implemented through measurement of water level from intake to the feeding pipeline. The SHPP will be equipped and automated to ensure remote control and protection and enable its operation only through periodic control. To this end the control system will represent a programmable automated device that includes complete information about marginal levels of control parameters. This ensures safe operation of hydro turbines and high level efficiency and safety.
The control (monitoring) system will be a simple one represented by a single programmable automated device for turbine and the entire SHPP. Furthermore, the system will have an interface, SCADA (or GSM modem) for remote transmission of information on water level, currency, voltage, active power etc.

**Sedvi 2**

Sedvi 2 SHPP is planned to be constructed on the medium stream of the river Kachachkut in the administrative area of the village Kachachkut. The water intake for SHPP will be implemented close to the conjunction point of the right tributary.

For this purpose a dam of 3m height will be constructed on the river with a shore type intake and the possibility to take water directly from the river.

According to the project design Sedvi 2 SHPP will use the pressure arising from the river points between 986 m and 788 m. The SHPP will have an installed capacity of 806 kW and a yearly average electricity production of 2,869.MWh. It utilizes a static pressure of 198 m and a calculated water flow of 550 l/s.

The structures of Sedvi 2 SHPP will be the following:

- Riverside type water intake on the river Kachachkut
- One-chamber sedimentary
- Iron penstock of 2,350m length and 600mm diameter
- Power house
- Tailrace channel
- Transformer substation and transmission lines.

**Headwork:**

It is envisaged to build a headwork structure of 3.0m height concrete spillover wall. The length of the wall will be 8m and a shore type of intake will be built on the riverside. Due to topographic conditions the sedimentary will be separate from headwork and the water will be supplied through a small inlet channel.

The settler will be composed of one chamber the bottom of which will have longitudinal and transverse incline.

The settler's chamber dimension for the given flow will be:

\[ B=2\text{m}, L=18\text{m}, H=1.6\text{m}. \]

The approximate volume of earthworks will be 210 m³ and the concrete works 52 m³ respectively.

A stream fish pass with discharge of 10 l/s will be constructed on the right bank edge.

**Pipeline:**

A metallic diversion pipeline of 600 mm diameter and a length of 2,515 m from the settler is proposed to be constructed. The pipeline route will go along the left side slope to the power house.

The project owner has received all required agreements. For installation of pipeline it is proposed to implement a 3-4m width platform along left river bank.

**Power House:**

The power house will be built on a small land plot that belongs to the project owner. The following facilities will be located in the building:

3. Machine house
4. Auxiliary structures

As the SHPP will be fully automated, no room is provided for operation staff. The total floor space of the constructed building will be 100 m². An overhead bridge crane will be provided in the building for installation and rehabilitation of power unit. An open handling and installation platform will be arranged in front of the house. The plant’s building will be fenced.

**Transformer substation and Transmission lines**
It is proposed to install one 0.4/35kV transformer with a power of 1,000kVA. The substation will be of open type. For the safety purpose a wire mesh fence will be constructed around the transformer. The power lines of 35 kV voltage and 1.2 km length will be connected to the State Power Network that runs through Alaverdi town.

**Diversion channel**
The diversion channel represents a rectangular reinforced concrete structure. It will remove water from the power unit to the river.

**Installed turbine:**
(see description under Sedvi 1 above)

The following table summarizes the above described main technical data of the SHPPs Sedvi 1 and Sedvi 2.

<table>
<thead>
<tr>
<th>Topographical data</th>
<th>Sedvi 1</th>
<th>Sedvi 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of the river</td>
<td>Sedvi 1</td>
<td>Sedvi 2</td>
</tr>
<tr>
<td>Coordinates of Intake:</td>
<td>41.09847° N; 44.58703° E</td>
<td>41.090047° N; 44.587686° E</td>
</tr>
<tr>
<td>Coordinates of Power house:</td>
<td>41.09005° N; 44.587686° E</td>
<td>41.081717° N; 44.611758° E</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technical parameters</th>
<th>Sedvi 1</th>
<th>Sedvi 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total installed capacity:</td>
<td>377 kW</td>
<td>806 kW</td>
</tr>
<tr>
<td>Annual energy production:</td>
<td>1,307.8 MWh</td>
<td>2,869.4 MWh</td>
</tr>
<tr>
<td>Plant Load factor</td>
<td>0.396</td>
<td>0.406</td>
</tr>
<tr>
<td>Gross head:</td>
<td>174.1 m</td>
<td>198</td>
</tr>
<tr>
<td>Net head (at design flow):</td>
<td>151.76 m</td>
<td>175.9 m</td>
</tr>
<tr>
<td>Turbine design flow:</td>
<td>0.3 m³/s</td>
<td>0.55 m³/s</td>
</tr>
<tr>
<td>Turbine type:</td>
<td>Cross flow aggregate (Osberger or Cink)</td>
<td>Cross flow aggregate (Osberger or Cink)</td>
</tr>
<tr>
<td>Number of units:</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Grid connection voltage:</td>
<td>0.4 kV / 10 kV to Alaverdi town</td>
<td>0.4 kV / 35 kV to Alaverdi town</td>
</tr>
<tr>
<td>HV-line length:</td>
<td>1.8 km</td>
<td>1.2 km</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Construction data</th>
<th>Sedvi 1</th>
<th>Sedvi 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of intake:</td>
<td>Shore type water intake</td>
<td>Riverside type water intake</td>
</tr>
<tr>
<td>Intake water level:</td>
<td>1,164 m</td>
<td>986 m</td>
</tr>
<tr>
<td>Transmission structure type:</td>
<td>penstock</td>
<td>penstock</td>
</tr>
<tr>
<td>Penstock material:</td>
<td>metallic</td>
<td>metallic</td>
</tr>
<tr>
<td>Penstock length:</td>
<td>910 m</td>
<td>2,515 m</td>
</tr>
<tr>
<td>Penstock diameter:</td>
<td>400 mm</td>
<td>600 mm</td>
</tr>
<tr>
<td>Level at the powerhouse:</td>
<td>989.6 m</td>
<td>787.5 m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Designed Lifetime</th>
<th>Sedvi 1</th>
<th>Sedvi 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lifetime:</td>
<td>30 years</td>
<td>30 years</td>
</tr>
</tbody>
</table>

Prior to the implementation of the underlying CPA under the PoA “Small Hydropower Programme of Activities in Armenia”, electricity in Armenia is delivered from the Armenian grid, with the majority of electricity delivered from (old) HPPs and one Nuclear Power Plant (Medzamor NPP). 20 to 25 % of the total electricity generation in Armenia is generated by fossil fuelled thermal power plants.

The baseline scenario of the project activity is the same as the scenario existing prior to the start of implementation of the project activity. The project activity will generate renewable power with zero GHG emissions, which will displace part of the electricity otherwise supplied by the Armenian grid. The “Small Hydropower PoA in Armenia - Sedvi 1 + 2 Hydropower Project” is a run-of-river power plant without reservoir.
With an *ex-ante* calculated grid emission factor of 0.4198 tCO₂/MWh and a yearly net electricity production of 4,177.2 MWh the project will achieve a yearly CO₂ emission reduction of 1,754 tCO₂, which means a reduction of 12,275 tCO₂ over the 7 years of the renewal crediting period.

### A.6. Party(ies)

<table>
<thead>
<tr>
<th>Name of Party involved (host) indicates a host Party</th>
<th>Private and/or public entity(ies) CPA implementer(s) (as applicable)</th>
<th>Indicate if the Party involved wishes to be considered as CPA implementer (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armenia (host)</td>
<td>SEDVI ENERGO LLC</td>
<td>No</td>
</tr>
</tbody>
</table>

Contact information of CPA implementer/s is in Appendix 1 of this CPA-DD.

### A.7. Geographic reference or other means of identification

>> Geographic reference: Sedvi 1 + 2 Hydropower project is lying at the Katchchikut River in Katchchikut community and Aqori community, respectively of Lori marz in the Republic of Armenia.

The following figure shows the map of Lori Marz of the Republic of Armenia. Lori Marz is located in the very north of the country.
GPS coordinates of Sedvi 1:

<table>
<thead>
<tr>
<th>Coordinates of Intake:</th>
<th>41.09847 N; 44.58703 E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinates of Power house:</td>
<td>41.090047 N; 44.587686 E</td>
</tr>
</tbody>
</table>

GPS coordinates of Sedvi 2:

<table>
<thead>
<tr>
<th>Coordinates of Intake:</th>
<th>41.090047 N; 44.587686 E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinates of Power house:</td>
<td>41.081717 N; 44.611758 E</td>
</tr>
</tbody>
</table>

**A.8. Duration of the CPA**

**A.8.1. Start date of the CPA**

The start date of the CPA is the start of construction which is expected to be 01/09/2012.

Sedvi Energo LLC confirms that the starting date of the CPA is not before the start of validation (uploading for global stakeholder consultation) of the PoA “Small Hydropower Programme of Activities in Armenia”.

**A.8.2. Expected operational lifetime of the CPA**

Expected and designed operational lifetime of the SHPP is 30 years and 0 months.

**A.9. Choice of the crediting period and related information**

Sedvi Energo LLC chooses the renewable crediting period (7 years, renewable twice).

**A.9.1. Start date of the crediting period**

01/01/2014: expected date of commissioning

**A.9.2. Length of the crediting period**

7 years (first crediting period)]

NOTE: duration of crediting period of the CPA shall be limited to the end date of the PoA regardless of when the CPA was added.
A.10. Estimated amount of GHG emission reductions

<table>
<thead>
<tr>
<th>Years</th>
<th>Annual GHG emission reductions (in tonnes of CO$_2$e) for each year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>1,754</td>
</tr>
<tr>
<td>2015</td>
<td>1,754</td>
</tr>
<tr>
<td>2016</td>
<td>1,754</td>
</tr>
<tr>
<td>2017</td>
<td>1,754</td>
</tr>
<tr>
<td>2018</td>
<td>1,754</td>
</tr>
<tr>
<td>2019</td>
<td>1,754</td>
</tr>
<tr>
<td>2020</td>
<td>1,754</td>
</tr>
<tr>
<td></td>
<td><strong>Total number of crediting years</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Annual average GHG emission reductions over the crediting period</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Total estimated reductions (tonnes of CO$_2$e)</strong></td>
</tr>
</tbody>
</table>

A.11. Public funding of the CPA
The project does not receive public funding from Parties included in Annex 1.

A.12. Debundling of small-scale component project activities
>> The proposed CPA “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” is not a debundled component of a large-scale activity, as demonstrated below according to provisions of the latest version of the Guidelines on assessment of debundling for SSC project activities:

The CME confirms that:
- there is no existing activity which has the same activity implementer as the proposed small scale CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same technology type within 1 km distance to the project activity at the closest point.

The CME confirmed the fact by checking the UNFCCC web page on 31/07/2012 by comparing the coordinates of existing project activities with the proposed project activity.

A.13. Confirmation for CPA
>> Sedvi Energo LLC proclaims that the CPA “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” is not registered as an individual CDM project activity nor it is a part of another registered PoA.

The coordinating & managing entity (CME) of the PoA has checked and confirms that the CPA “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” is not registered as an individual CDM project activity nor it is a part of another registered PoA.

The CME confirmed the fact by checking the UNFCCC web page on 31/07/2012.
SECTION B. Environmental analysis

B.1. Analysis of the environmental impacts

In accordance with Section E of the “Small Hydropower Programme of Activities in Armenia” PoA-DD, the environmental analysis is undertaken at CPA level.

For both projects, Sedvi 1 and Sedvi 2 separate Environmental Assessment Reports (EAs) have been developed by company Hydroenergetica LLC in 2011, using the World Bank OP 4.01 - Environmental Assessment, which serves as a guideline for preparation of EA Report for Small hydro power plants construction.

Both EAs list positive as well as potential negative impacts. Positive impacts are the expansion of ecologically clean renewable energy production and the security of supply. On the negative side there are temporary negative effects such as dust, noise, construction waste and other similar problems that are typical for construction activities.

Digging pits in the river bed may cause water pollution by suspended sediments this may cause clogging of fish gills. HPP construction and pipeline installation may have negative impact on vegetative layer of the area, due to loss of vegetation on HPP building site, partial water removal from the river bed and piling of construction waste as well as laying underground pipeline.

Overall, there will be no loss of vegetation species, taking into consideration that there were no extinguishing, endangered and critical condition vegetation species found during investigation of the area, while the vegetative layer of future HPP building and pipeline location is typical and well represented in the surroundings of the construction site.

Both EA reports contain a respective Environmental Management Plan with a list of mitigation measures.

For both projects the Environmental Permit (“Environmental Conclusion”) was issued on the 20th December 2011 by the Armenian government, Ministry of Nature Protection.

SECTION C. Local stakeholder comments

C.1. Solicitation of comments from local stakeholders

>> In accordance with Section F of the “Small Hydropower Programme of Activities in Armenia” PoA-DD, the stakeholders’ comments are invited at the CPA level.

The comments of stakeholders to the Sedvi 1 + 2 Hydropower project have been invited, as follows:

Public Hearings of the Detailed Design Documents of Sedvi 1 and Sedvi 2 SHPPs to be constructed in the Administrative Area of Katchatchkut Village took place on 5th December 2011 in Lori Marz, RA, Katchatchkut village and Lori Marz, RA, Aqori Village, respectively.

Both meetings have been announced to the public media in advance («Hayastani Hanrapetutyun», which means «Republic of Armenia) and additionally on the local blackboard of the communities Aquori and Kachachkut.

In both cases the members of the Community Council Quorum expressed their positive views on the SHPP Construction. It was decided to approve the Detailed Design for construction of the SHPPs and to approve the environmental mitigation measures foreseen in the project.

C.2. Summary of comments received

During the public Hearings, following comments and questions by the Public have been raised:
a) Impact of the SHPPs on water for irrigation of the fields  
b) Impact on fishing possibility in the river for villagers  
c) Availability of cheaper electricity for the villagers from the SHPPs  
d) Possibility for employment by the project developer

C.3. Report on consideration of comments received

The EA and outcomes of the meeting have been documented according to national legislation and requirements. The Environmental Conclusion (Environmental Permit) has been issued by the Ministry of Nature Protection. Several “Expert Opinions” were gathered in order to prepare accordingly for mitigation measures.

Ad a)  
Water use for irrigation purposes has been included in the energy production calculations, which means that water required for irrigation will be available in the river and not taken by SHPPs.

Ad b)  
A fish-pass is being constructed at Sedvi 2.

Ad c)  
N.A.

Ad d)  
Local workforce(s) – both skilled and unskilled workers – are specifically invited to apply for jobs during the construction period.
SECTION D. Eligibility of CPA and Estimation of emissions reductions

D.1. Title and reference of the approved baseline and monitoring methodology(ies) selected:

>> Proposed CPA “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” is applying methodology AMS-I.D.: Version 17 (EB 61); reference: http://cdm.unfccc.int/methodologies/DB/RSCTZ8SKT4F7N1CFDXCSA7BDQ7FU1X..

D.2. Application of methodology(ies)

>> Demonstration of how the proposed CPA meets the applicability conditions of the methodology:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Requirement</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>I. - Renewable energy projects</td>
<td>Proposed CPA “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” is a small hydro power plant.</td>
</tr>
<tr>
<td>Scale</td>
<td>Small scale, under 15 MW of installed capacity; during every year of the crediting period of the CPA</td>
<td>Proposed CPA has installed capacity of 1.183 MW. Once constructed, the installed capacity remains the same through the whole life time of the CPA.</td>
</tr>
<tr>
<td>Technology/measure</td>
<td>1. Installing a new renewable energy power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant),</td>
<td>Proposed CPA is a greenfield project activity.</td>
</tr>
<tr>
<td></td>
<td>2. New renewable power plant will be supplying electricity to a national or a regional grid</td>
<td>Proposed CPA is/will be supplying the generated electricity to the Armenian electricity grid.</td>
</tr>
<tr>
<td></td>
<td>3. New renewable power plant will be run-of-river small hydro power plant and/or small hydro power plant with reservoir</td>
<td>Proposed CPA is a small run-of-river hydro power plant.</td>
</tr>
<tr>
<td></td>
<td>4. If small hydro power plants with reservoirs then • implemented in an existing reservoir with no change in the volume of the reservoir; or • implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section of the applied methodology, is greater than 4 W/m$^2$; or • implementing new reservoir and the power density of the power plant, as per definitions given in</td>
<td>N.A.</td>
</tr>
</tbody>
</table>
the project emissions section of
the applied methodology, is
greater than 4 W/m$^2$.

D.3. Sources and GHGs

As per the methodology AMS I.D., Version 17 (EB 61) paragraph 9 “The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.”

The sources and gases included in the project boundary are related to the production of electricity from fossil fuel. This involves emissions from displaced fossil fuel use at power plants connected to the electricity grid of Armenia.

Table below illustrates the emission sources and gases included in the project boundary for the purpose of calculating project emissions and baseline emissions:

<table>
<thead>
<tr>
<th>Source</th>
<th>Gas</th>
<th>Included?</th>
<th>Justification / Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO$_2$ emissions from electricity generation in fossil fuel fired</td>
<td>CO$_2$</td>
<td>Yes</td>
<td>Main emission source</td>
</tr>
<tr>
<td>power plants that are displaced due to the project activity</td>
<td>CH$_4$</td>
<td>No</td>
<td>Minor emission source</td>
</tr>
<tr>
<td></td>
<td>N$_2$O</td>
<td>No</td>
<td>Minor emission source</td>
</tr>
<tr>
<td>Project activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO$_2$ emissions from on-site consumption of fossil fuels due to</td>
<td>CO$_2$</td>
<td>No</td>
<td>Not applicable, no fossil</td>
</tr>
<tr>
<td>the project activity</td>
<td>CH$_4$</td>
<td>No</td>
<td>fuel consumption</td>
</tr>
<tr>
<td></td>
<td>N$_2$O</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Emissions related to the operation of geothermal power plants</td>
<td>CO$_2$</td>
<td>No</td>
<td>Not applicable, no geothermal</td>
</tr>
<tr>
<td></td>
<td>CH$_4$</td>
<td>No</td>
<td>power plant</td>
</tr>
<tr>
<td></td>
<td>N$_2$O</td>
<td>No</td>
<td>Not applicable, no geothermal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>power plant</td>
</tr>
<tr>
<td>Emissions from water reservoirs from hydro power plants</td>
<td>CO$_2$</td>
<td>No</td>
<td>Minor emission source</td>
</tr>
<tr>
<td></td>
<td>CH$_4$</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td>N$_2$O</td>
<td>No</td>
<td>Minor emission source</td>
</tr>
</tbody>
</table>

Proof that the CPA is located within the geographical boundary of the registered PoA:

GPS coordinates of the proposed CPA are:

GPS coordinates of Sedvi 1:

<table>
<thead>
<tr>
<th>Coordinates of Intake:</th>
<th>41.09847 N; 44.58703 E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinates of Power house:</td>
<td>41.090047 N; 44.587686 E</td>
</tr>
</tbody>
</table>

GPS coordinates of Sedvi 2:

<table>
<thead>
<tr>
<th>Coordinates of Intake:</th>
<th>41.090047 N; 44.587686 E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinates of Power house:</td>
<td>41.081717 N; 44.611758 E</td>
</tr>
</tbody>
</table>
These sites are located within the boundaries of Armenia which is the defined PoA boundary.

**D.4. Description of the baseline scenario**

>> As per the methodology AMS I.D., Version 17 (EB 61), paragraph 10 the baseline scenario is prescribed if the project activity is the installation of a new grid connected renewable power plant/unit as follows: “The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid”.

In the absence of the proposed CPA, the end power consumers would be supplied by the Armenian electricity grid.

**D.5. Demonstration of eligibility for a CPA**

>> The eligibility criteria for inclusion of a CPA in the PoA are based on the requirements of the “Standard for demonstration of additionality, development of eligibility criteria and application of multiples methodologies for programme of activities”, Version 01.0 (EB 65) (further on referred to as “PoA Standard”).

Proposed CPA Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” demonstrates its eligibility for inclusion under the PoA “Small Hydro Power Programme of Activities in Armenia” through the listed evidences for each eligibility criterion, as follows:

<table>
<thead>
<tr>
<th>(a)</th>
<th><strong>Eligibility criterion:</strong> The geographical boundary of the CPA including any time-induced boundary(^1) is consistent with the geographical boundary set in the PoA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demonstration of complying with the eligibility criterion:</strong></td>
<td>Proposed CPA Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” will be installed within the boundaries of Armenia.</td>
</tr>
</tbody>
</table>
| **Evidence for demonstration of CPA compliance with criterion:** | 1. GPS coordinates of the CPA - Powerhouse of Sedvi 1 are: 41.090047 N; 44.587686 E  
GPS coordinates of the CPA - Powerhouse of Sedvi 2 are: 41.081717 N; 44.611758 E |

<table>
<thead>
<tr>
<th>(b)</th>
<th><strong>Eligibility criterion:</strong> Conditions that avoid double counting of emission reductions like unique identifications of product and end-user locations (e.g. programme logo)</th>
</tr>
</thead>
</table>
| **Demonstration of complying with the eligibility criterion:** | Proposed “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” is uniquely identified and defined in an unambiguous manner by its GPS coordinates.  
The CPA is not and will not be registered as a part of any other PoA or as an individual CDM project. |
| **Evidence for demonstration of CPA compliance with criterion:** | 1. UNFCCC web site check by the CME on 31/07/2012 and confirmation that the CPA is not registered as a part of any other PoA or as an individual CDM project at the time of CPA inclusion under the PoA. |

<table>
<thead>
<tr>
<th>(c)</th>
<th><strong>Eligibility criterion:</strong> The specifications of technology/measure including the level and type of service, performance specification including compliance with testing/certifications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demonstration of complying with the eligibility criterion:</strong></td>
<td>Proposed “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project”)” employs a hydropower technology with total installed capacity of 1.183 MW which is within the 15 MW threshold.</td>
</tr>
<tr>
<td><strong>Evidence for demonstration of CPA compliance with criterion:</strong></td>
<td>Sedvi 1 SHPP (on the river Kachachkut) Project Feasibility Study; Yerevan 2012, prepared by</td>
</tr>
</tbody>
</table>

---

\(^1\) For example, an emission factor for electricity generation is dependent on the boundaries of regional or state or sub-regional grids.
(d) **Eligibility criterion:** Conditions to check the start date of the CPA through documentary evidence

**Demonstration of complying with the eligibility criterion:**
The starting date of the CPA is after the start date of the PoA.

**Evidence for demonstration of CPA compliance with criterion:**
Check and comparison of the dates by CME on 31/07/2012, confirming that:

- The starting date of the PoA is: 31/07/2012
- The starting date of the CPA is the start of construction which is expected to be 01/09/2012. This is after the start date of the PoA.

(e) **Eligibility criterion:** Conditions that ensure compliance with applicability and other requirements of single or multiple methodology/ies applied by CPAs

**Demonstration of complying with the eligibility criterion:**
1. Proposed “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” is applying the methodology AMS-I.D.: Version 17 (EB61);
2. Proposed “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” will be connected to the Armenian electricity grid.

**Evidence for demonstration of CPA compliance with criterion:**
1. Check of the UNFCCC web site by CME on 30/06/2012 methodology AMS-I.D. Version 17 (EB 61)
2. Based on RA legislation all the power generated by small hydropower plants has to be purchased by the grid (Armenian Electric Networks CJSC) according to the feed-in tariff for 15 years after start of operation. Power Purchase Agreement is signed before commencement of operation.

(f) **Eligibility criterion:** The conditions that ensure that CPAs meet the requirements pertaining to the demonstration of additionality

**Demonstration of complying with the eligibility criterion:**
Proposed “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” clearly demonstrates its additionality.

**Evidence for demonstration of CPA compliance with criterion:**
Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” is a small scale project activity and demonstrates its additionality in accordance with the “Simplified modalities and procedures for small-scale CDM project activities”, as described in the Appendix 6 of the PoA-DD, as follows:

*Access-to-finance barrier:* the project activity could not access appropriate capital without consideration of the CDM revenues. Best practice examples include but are not limited to, the demonstration of limited access to capital in the absence of the CDM, such as a statement from the financing bank that the revenues from the CDM are critical in the approval of the loan.

The Access-to-finance barrier is evidenced by a statement from the financing bank clarifying that CO₂ reductions and associated CDM revenues are critical for providing a loan to the holding company of the proposed CPA.

(g) **Eligibility criterion:** The PoA-specific requirements stipulated by the CMEs including any conditions related to undertaking local stakeholder consultations and environmental impact
### Analysis

**Demonstration of complying with the eligibility criterion:**

1. Proposed “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” has undertaken the environmental analysis, as described in Section B. of this CPA-DD.
2. Proposed “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” has conducted the stakeholder involvement process and has taken into the due account all the concerns raised during the stakeholder meeting(s), as described in Section C. of this CPA-DD.
3. Proposed CPA “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” shall implement only the new power generation equipment. No power generation equipment shall be transferred from other existing facility to the project activity.

**Evidence for demonstration of CPA compliance with criterion:**

1. EIA report. Details are described in the Section B of this CPA-DD.
2. Expert Report on environmental impact expertise. Details are described in the Section C of this CPA-DD.
3. CPA implementer proclaims in this CPA-DD that no public funding from Annex I country is/will be involved in the CPA.

### Eligibility criterion: Conditions to provide an affirmation that funding from Annex I parties, if any; does not result in a diversion of official development assistance.

**Demonstration of complying with the eligibility criterion:**

No public funding from Annex I country is/will be involved in the CPA.

**Evidence for demonstration of CPA compliance with criterion:**

CPA implementer of the proposed CPA “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” proclaims in this CPA-DD that no public funding from Annex I country is involved in the CPA.

### Eligibility criterion: Where applicable, target group (e.g. domestic (commercial/industrial, rural/urban, grid-connected/off-grid) and distribution mechanisms (e.g. direct installation))

**Demonstration of complying with the eligibility criterion:**

CPA implementer is a developer of hydropower project in Armenia. There are no specific distribution mechanisms.

**Evidence for demonstration of CPA compliance with criterion:**

The CPA implementer is identified in the CPA-DD. No specific evidence is needed.

### Eligibility criterion: Where applicable, the conditions related to sampling requirements for a PoA in accordance with the approved guidelines/standard from the Board pertaining to sampling and surveys

**Demonstration of complying with the eligibility criterion:**

Not applicable since no sampling will be done within the CPA.

---

2 See also paragraph 6 (m) of “Procedures for registration of a programme of activities as a single CDM project activity and issuance of CERs for a PoA”
3 A. Harutyunyan, Minister of Nature protection of RA 20/12/2011, Expertise Conclusion on environmental impact assessment report (BP 125) issued to “Sedvi Energo” LLC Activity on Detailed Design Documents for construction of Sedvi-1 and Sedvi-2 SHPPs Lori marz, RA
4 A. Harutyunyan, Minister of Nature protection of RA 20/12/2011, Expert Report on environmental impact expertise (BP 125) issued to “Sedvi Energo” CJSC Activity on Work plan of construction of Sedvi-1 and Sedvi-2 SHPPs Lori marz, RA
5 This is to re-test the validity of assumptions made at the PoA level. For example, in a lighting efficiency application, lighting usage hours of 3.5 hours per day would be valid if the target group is residence/households. Usage hours would be different in commercial applications and vice versa.
### Evidence for demonstration of CPA compliance with criterion:
Not applicable since no sampling will be done within the CPA.

### (k) Eligibility criterion:
Where applicable, the conditions that ensure that CPA in aggregate meets the small-scale or micro-scale threshold criteria (please refer to the latest approved version of the Guidelines for demonstrating additionality of microscale project activities. and the latest approved version of the General Guidelines to SSC CDM methodologies.) and remain within those thresholds throughout the crediting period of the CPA.

**Demonstration of complying with the eligibility criterion:**
The proposed “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” is throughout the whole crediting period a SSC project activity with a total installed capacity **1.183 MW** which is under 15MW.

**Evidence for demonstration of CPA compliance with criterion:**
Sedvi 1 SHPP (on the river Kachachkut) Project Feasibility Study; Yerevan 2012, prepared by Hydroenergetica Ltd.
Sedvi 2 SHPP (on the river Kachachkut) Project Feasibility Study; Yerevan 2010, prepared by Hydroenergetica Ltd.

### (l) Eligibility criterion:
Where applicable, the requirements for the debundling check, in case CPAs belong to small-scale (SSC) or microscale project categories.

**Demonstration of complying with the eligibility criterion:**
The proposed “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” is a SSC project activity and not a de-bundled component of a large scale project activity.

**Evidence for demonstration of CPA compliance with criterion:**
Check of the UNFCCC web site by CME on 31/07/2012 confirming that:
There is no existing activity which has the same activity implementer as the proposed small scale CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same sectoral scope.
The CME confirmed the fact by checking the UNFCCC web page on 31/07/2012.

### (m) Eligibility criterion:
Individual criterion to enhance environmental and social performance of CPAs under the PoA.

**Demonstration of criterion usability to assess the CPA inclusion:**
Only a CPA that is not objected by the Armenian DNA shall be eligible under the PoA.

**Evidence for demonstration of CPA compliance with criterion:**
The letter of approval for the PoA covers also the non objection to the first CPA.
D.6. Estimation of emission reductions

D.6.1. Explanation of methodological choices

According to the selected methodology AMS-I.D., Version 17, (EB 61), paragraph 11: *The baseline emissions are the product of electrical energy baseline $E_{GBL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.*

$$BE_y = E_{GBL,y} \times EF_{CO2,grid,y}$$

*(Equation 1, AMS-I.D., Version 17)*

Where:

- $BE_y$: Baseline emissions in year $y$ ($tCO_2$)
- $E_{GBL,y}$: Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year $y$ (MWh)
- $EF_{CO2,grid,y}$: CO$_2$ emission factor of the grid in year $y$ ($tCO_2$/MWh)

The quantity of net electricity supplied to the grid ($E_{GBL,y}$) will be calculated annually according to the on-site measurements in the small hydro power plant as the difference between the total (gross) electricity generation of the project activity SHPP in the year $y$ ($E_{Gross,y}$) and the electricity consumption of the project activity in the year $y$ (electricity consumption by the auxiliary equipment at the plant: $EC_y$).

$$E_{GBL,y} = E_{Gross,y} - EC_y$$

*(supportive equation)*

Where:

- $E_{GBL,y}$: Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year $y$ (MWh)
- $E_{Gross,y}$: Quantity of the total (gross) electricity generation of the project activity SHPP in the year $y$ (on-site measurements) (MWh)
- $EC_y$: Quantity of the electricity consumption of the project activity in the year $y$ (electricity consumption by the auxiliary equipment at the plant, on-site measurements) (MWh)

The grid emission factor of the Armenian grid has been sourced from the PoA-DD of the “Small Hydro Power Programme of Activities in Armenia”.

*GEF of Armenia = 0.4198 tCO$_2$/MWh (2010)*

As described in Annex 4 of the PoA-DD, the Combined Margin (CM) Grid Emission Factor (GEF) is calculated *ex-ante* for the years 2009 to 2011.

This *ex-ante* GEF will be calculated once during validation of the underlying PoA and fixed at validation of the PoA; and it is used by the proposed CPAs fixed for the first crediting period of the CPA.

The grid emission factor will be revised and updated at the point of the renewal crediting period of the CPA – the GEF valid for the respective crediting period of the PoA shall be used.

**Calculation of Project Emissions**

According to AMS-I.D., Version 17 (EB 61), paragraph 20: *For most renewable energy the project activities, $PE_y = 0$.*

Since “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project” are run-of-river power plants NO Project Emissions (PEs) occur.
Calculation of Leakage Emissions
According to AMS-I.D., Version 17 (EB 61), paragraph 22: if the energy generating equipment is transferred from another activity, the leakage is to be considered.

No power generating equipment will be transferred from another activity to the proposed CPA as a consequence of the eligibility (see eligibility criterion (g) 3. of Section D.5. of above) NO leakage is considered since only new equipment is used.

Thus: \( LE_y = 0. \)

Calculation of Emission Reductions
Emission Reductions are calculated according to AMS-I.D. Version 17, paragraph 23, as difference between the baseline emissions and project emissions.

\[
ER_y = BE_y - PE_y - LE_y
\]

\( (Equation \ 10, \ AMS-I.D, \ Version \ 17)\)

Where:
- \( ER_y \) Emission reductions in year \( y \) (tCO\(_2\)/y)
- \( BE_y \) Baseline emissions in year \( y \) (tCO\(_2\)/y)
- \( PE_y \) Project emissions in year \( y \) (tCO\(_2\)/y)
- \( LE_y \) Leakage emissions in year \( y \) (tCO\(_2\)/y)

D.6.2. Data and parameters that are to be reported ex-ante

<table>
<thead>
<tr>
<th>Data / Parameter:</th>
<th>EF(_{\text{CO}<em>2,\text{grid},y}) (EF(</em>{\text{grid,CM}}) (Armenian))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data unit:</td>
<td>tCO(_2)/MWh</td>
</tr>
<tr>
<td>Description:</td>
<td>CO(_2) emission factor of the grid in year ( y )</td>
</tr>
<tr>
<td>Source of data:</td>
<td>Calculated as Combined margin CO(_2) emission factor for grid connected power generation in year ( y ) (tCO(_2)/MWh)</td>
</tr>
<tr>
<td>Value(s) applied:</td>
<td>0.4198 tCO(_2)/MWh</td>
</tr>
<tr>
<td>Choice of data or measurement methods and procedures</td>
<td>Calculated \textit{ex ante} according to the GEF Tool, Version 02.2.1 (EB 63), as provided in the PoA-DD in Annex 4 (see also clarification under section D.6.1. above)</td>
</tr>
<tr>
<td>Purpose of data:</td>
<td>(i) Calculation of baseline emissions</td>
</tr>
<tr>
<td>Additional comment:</td>
<td>The Armenian grid emission factor is determined \textit{ex-ante} once at the PoA validation stage, and fixed for the first 7 years of the PoA crediting period. Thus no monitoring and recalculation of the emissions factor for future CPAs is required during the first 7 years of the PoA. It will be used as fixed by the proposed CPA during the first 7 years of the first CPA crediting period. The grid emission factor will be revised and updated at the point of the renewal crediting period of the CPA – the GEF valid for the respective crediting period of the PoA shall be used.</td>
</tr>
</tbody>
</table>
D.6.3. Ex-ante calculation of emission reductions

Ex-ante calculations of the envisaged Emission Reductions (ER) are made by using the Hydroenergetica LCC estimates\(^6\) of electricity generation for the “Small Hydropower PoA in Armenia – Sedvi 1 + 2 Hydropower Project”.

For the ex-ante calculation of emission reductions the following net electricity generation is taken into account:

Sedvi 1 + 2 Hydropower Project 1.183 MW 4,177.2 MWh

Sedvi Energo LCC expects to deliver this amount of net electricity generation to the national grid of Armenia from January 2014 onwards.

No leakage (LE\(_y\)) has to be considered according to the applied approved methodology AMS I.D. (Version 17), if new equipment is installed. This is an eligibility criterion for inclusion of a CPA into the PoA “Small Hydropower Programme of Activities in Armenia”.

No Project Emissions (PE\(_y\)) have to be considered since the underlying CPA “Small Hydropower PoA in Albania and Serbia- Sedvi 1 + 2 Hydropower Project” is a run-of-river power plant without reservoir.

Thus the emission reductions are calculated as follows:

\[
ER_y = BE_y - PE_y
\]

Where:

\[
ER_y = \text{Emission reductions in year } y \text{ (t CO}_2\text{e/yr)}
\]

\[
BE_y = \text{Baseline emissions in year } y \text{ (t CO}_2\text{e/yr)}
\]

\[
PE_y = \text{Project emissions in year } y \text{ (t CO}_2\text{e/yr)}
\]

The Combined Margin (CM) emission factor according to the “Tool to calculate the emission factor for an electricity system (Version 02.2.1)” for the national electricity grid of Armenia was calculated as described in the PoA “Small Hydropower Programme of Activities in Armenia”.

When Sedvi 1 + 2 is in full operation the Baseline Emissions (BE\(_y\)) are calculated as follows:

\[
BE_y = EG_y \times EF_{CO_2,grid,y} = 4,177.2 \text{ MWh} \times 0.4198 \text{ tons CO}_2/\text{MWh} = 1,754 \text{ tons CO}_2/\text{year}
\]

D.6.4. Summary of the ex-ante estimates of emission reduction

<table>
<thead>
<tr>
<th>Year</th>
<th>Baseline emissions (t CO(_2)e)</th>
<th>Project emissions (t CO(_2)e)</th>
<th>Leakage (t CO(_2)e)</th>
<th>Emission reductions (t CO(_2)e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>1,754</td>
<td>0</td>
<td>0</td>
<td>1,754</td>
</tr>
<tr>
<td>2015</td>
<td>1,754</td>
<td>0</td>
<td>0</td>
<td>1,754</td>
</tr>
<tr>
<td>2016</td>
<td>1,754</td>
<td>0</td>
<td>0</td>
<td>1,754</td>
</tr>
<tr>
<td>2017</td>
<td>1,754</td>
<td>0</td>
<td>0</td>
<td>1,754</td>
</tr>
<tr>
<td>2018</td>
<td>1,754</td>
<td>0</td>
<td>0</td>
<td>1,754</td>
</tr>
<tr>
<td>2019</td>
<td>1,754</td>
<td>0</td>
<td>0</td>
<td>1,754</td>
</tr>
<tr>
<td>2020</td>
<td>1,754</td>
<td>0</td>
<td>0</td>
<td>1,754</td>
</tr>
<tr>
<td>Total</td>
<td>12,275</td>
<td>0</td>
<td>0</td>
<td>12,275</td>
</tr>
</tbody>
</table>

| Total number of crediting years | 7 (for the first crediting period) |
| Annual average over the crediting period | 1,754 |

\(*\) Sedvi 1 SHPP (on the river Kachachkut) Project Feasibility Study; Yerevan 2012, prepared by Hydroenergetica Ltd.; Sedvi 2 SHPP (on the river Kachachkut) Project Feasibility Study; Yerevan 2010, prepared by Hydroenergetica Ltd.
D.7. Application of the monitoring methodology and description of the monitoring plan

D.7.1. Data and parameters to be monitored

(Copy this table for each data and parameter.)

<table>
<thead>
<tr>
<th>Data / Parameter</th>
<th>Description</th>
<th>Source of data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity of net electricity supplied to the grid as result of the implementation of the CDM project activity in the year $y$</td>
<td>Calculated from the on-site measurements Calculated as the difference between the total (gross) electricity generation of the project activity in the year $y$ ($EG_{\text{gross},y}$) and the electricity consumption of the project activity in the year $y$ (auxiliary electricity consumption at the SHPP ($EC_y$))</td>
<td></td>
</tr>
</tbody>
</table>

| Value(s) applied | 4,177 MWh (this is the estimated value for the purpose of ex-ante emission reductions calculation) |
| Measurement methods and procedures | Calculated from the on-site measurements by electricity meter(s) at the point of feeding to and receiving from the grid |
| Monitoring frequency | The measurements will be continuous, with at least monthly recording and annual summarization. The data will be archived electronically for 2 years following the end of the last crediting period. |
| QA/QC procedures | Measured data used to calculate the net electricity supplied to the grid will be cross-checked with electricity purchase and the invoices for consumed electricity from Armenian Electric Networks CJSC. Measuring equipment will be properly calibrated and with proper accuracy, as described per each parameter individually |
| Purpose of data | (i) Calculation of baseline emissions |
| Additional comment | - |

<table>
<thead>
<tr>
<th>Data / Parameter</th>
<th>$EG_{\text{gross},y}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Quantity of the total gross electricity generated and supplied by the project activity SHPP to the grid in the year $y$</td>
</tr>
<tr>
<td>Source of data</td>
<td>On-site measurements by electricity meter(s) installed at the point of feeding in to the grid</td>
</tr>
<tr>
<td>Value(s) applied</td>
<td>4,204 MWh</td>
</tr>
<tr>
<td>Measurement methods and procedures</td>
<td>Electricity meter(s) at the point of delivery to the grid (10kV side of the transformer station in Odzun). The meter is in ownership of the grid operator and will be read manually monthly.</td>
</tr>
<tr>
<td>Monitoring frequency</td>
<td>The measurements will be continuous, with at least monthly recording and annual summarization. The data will be archived for 2 years following the end of the last crediting period.</td>
</tr>
</tbody>
</table>
The metering equipment will be properly calibrated in accordance with the instructions (schedules, procedures) for quality assurance from the technology provider and according to the relevant national/international calibration standard, as available. The owner of the meter is responsible for the calibration. Calibration should be undertaken as prescribed in the relevant paragraph of “General Guidelines to SSC CDM Methodologies”.

In Armenia (re)calibration of commercial electricity meters is "regulated" only by the instruction of the manufacturing plant of the device and is monitored by the owner (electricity supplier) accordingly. No special national regulation exists on this subject.

The accuracy of the meter is not lower than 0.5.

Measured data used to calculate the net electricity supplied to the grid will be cross-checked with electricity purchase and the invoices for consumed electricity from Armenian Electric Networks CJSC.

### Purpose of data

- **(i) Calculation of baseline emissions**

<table>
<thead>
<tr>
<th>Data / Parameter</th>
<th>Parameter</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>$EC_y$</td>
<td>MWh/y</td>
</tr>
<tr>
<td><strong>Source of data</strong></td>
<td>On-site measurements by electricity meter(s) installed at the point of consuming electricity from the grid</td>
<td></td>
</tr>
<tr>
<td><strong>Value(s) applied</strong></td>
<td>27 MWh (ex – ante estimation)</td>
<td></td>
</tr>
<tr>
<td><strong>Measurement methods and procedures</strong></td>
<td>Electricity meters at the power stations of the 2 project sites. The meters will be read electronically by means of the SCADA system.</td>
<td></td>
</tr>
<tr>
<td><strong>Monitoring frequency</strong></td>
<td>The measurements will be continuous, with at least monthly recording and annual summarization. The data will be archived for 2 years following the end of the last crediting period.</td>
<td></td>
</tr>
</tbody>
</table>
QA/QC procedures

The metering equipment will be properly calibrated in accordance with the instructions (schedules, procedures) for quality assurance from the technology provider and according to the relevant national calibration standard. Calibration should be undertaken as prescribed in the relevant paragraph of “General Guidelines to SSC CDM Methodologies”.

In Armenia (re)calibration of commercial electricity meters is "regulated" only by the instruction of the manufacturing plant of the device and is monitored by the owner (electricity supplier) accordingly. No special national regulation exists on this subject.

The accuracy of the meter is no lower than 0.5.

Electricity consumed by the project activity will be imported from the grid and therefore it will be cross-checked with the electricity invoices from Armenian Electric Networks CJSC.

Purpose of data

(i) Calculation of baseline emissions

Additional comment

D.7.2. Description of the monitoring plan

The monitoring plan and its implementation have been developed based on the PoA-DD and the approved methodology AMS I.D., Version 17 (EB 61)

Monitoring Plan Objective

The purpose of the monitoring plan is to measure the net electricity delivered to the Armenian electricity grid by the “Small Hydropower Programme of Activities in Armenia - Sedvi 1 + 2 Hydropower Project”.

Monitoring organization – CDM CPA team management structure and responsibilities

As the CPA implementer, Sedvi Energy will take the overall responsibility for daily operating, monitoring, recording and reporting of the data.

Staff to carry out the monitoring works and to report the data to the CME will be identified within the company according to the following structure:
Operational Personnel
Operational Personnel is responsible for the power plant operation on site, controlling the plant function and the monitoring equipment function.
Monitoring data obtained from the monitoring/measuring equipment shall be compiled and reported to the CPA Project Manager monthly, including report on any discrepancies, break-downs, etc. The monthly data and documents reported by the Operational Personnel will be compiled by the CPA Project Manager:
- data collected from the plant, aggregated
- discrepancy & correction actions report
- Executing calibration of the monitoring equipments as and when required

CPA Project Manager
CPA Project Manager is responsible for:
- the final review of the aggregated monthly reports,
- ensuring the compliance with requirements of the monitoring plan, CDM modalities and procedures, including calibration frequency
- Reporting to and communicating with CME Project Manager
- quality check confirmation
- Implementation of the corrective measures in case any discrepancy is observed
- calculation of the net electricity supplied to the grid by the project activity
- compiling an annual CPA report for the CME Project Manager

The Plant Manager is responsible for storing and archiving of all CDM related information relevant to the CPA in electronic form and in paper print-outs if relevant.
Monitoring and Archiving of Data

- Monitoring equipment and installation

Quantity of the gross electricity produced and supplied to the grid by the proposed project activity will be monitored by electricity meter installed the point of delivery to the grid (10kV side of the transformer station in Odzun). The meter of the type ABB EA02RAL B3 is in ownership of the grid operator and will be read monthly.

Quantity of the electricity consumption (consumption of the auxiliary equipment and the plant site) will be monitored by an electricity meter installed in the power stations of the 2 project sites, on the 10kV level of the internal transformer.

All equipment used will be in compliance with national technical standards.

- Data monitoring and management

All monitoring data and records will be archived in electronic form. Electronic documents will be backed up on compact disc or hard disc and stored for minimum 2 years after the end of each crediting period of the project activity.

Quality Assurance and Quality Control

To ensure that the data is reliable and transparent, the CPA implementer in cooperation with the CME will establish Quality Assurance and Quality Control (QA&QC) measures to effectively control and manage data reading, recording, auditing as well as archiving data and all relevant documents.

Monitoring equipment will be calibrated and inspected properly and periodically as per the instructions (schedules, procedures) for quality assurance from the equipment manufacturer/ provider or national/international standard industry norms and requirements, if available.

Procedures in case of damaged metering equipment

In case metering equipment is damaged and no reliable readings can be recorded, the procedures specified in the Power Purchase Agreement will be followed for the estimation of net electricity generation by the CPA.

Capacity development

CDM capacity development for the CPA Project Manager will be conducted by CDM experts (by CME or external expert approved by CME). This will ensure that the CPA Project Manager is prepared for the responsibilities with respect to the implementation of the proposed CPA.

SECTION E. Approval and authorization

Letter of Approval (LoA) from the host country is not yet available at the start of validation.
Appendix 1: Contact information on entity/individual responsible for the CPA

<table>
<thead>
<tr>
<th>Organization</th>
<th>SEDVI ENERGO LLC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street/P.O. Box</td>
<td>7th Street, House 16</td>
</tr>
<tr>
<td>Building</td>
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</tr>
<tr>
<td>City</td>
<td>Yerevan</td>
</tr>
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<tr>
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<td>Country</td>
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<tr>
<td>Telephone</td>
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</tr>
<tr>
<td>Fax</td>
<td></td>
</tr>
<tr>
<td>E-mail</td>
<td><a href="mailto:grigor.gabayan@hydroenergetica.am">grigor.gabayan@hydroenergetica.am</a></td>
</tr>
<tr>
<td>Website</td>
<td></td>
</tr>
<tr>
<td>Contact person</td>
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</tr>
<tr>
<td>Title</td>
<td></td>
</tr>
<tr>
<td>Salutation</td>
<td>Mr.</td>
</tr>
<tr>
<td>Last name</td>
<td>Gabayan</td>
</tr>
<tr>
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<td>Department</td>
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<tr>
<td>Mobile</td>
<td>+374 98 919111</td>
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<tr>
<td>Direct fax</td>
<td>+374 10 655380</td>
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<tr>
<td>Direct tel.</td>
<td>+374 10 653159</td>
</tr>
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<td>Personal e-mail</td>
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</tr>
</tbody>
</table>

Appendix 2: Affirmation regarding public funding

The CPA “Small Hydropower PoA in Armenia – Sedvi 1 + 2 Hydropower Project” does not receive public funding from Parties included in Annex I.

(Refer to section A.11 of this CPA-DD)

Appendix 3: Applicability of the selected methodology(ies)

Refer to section D.2. of this CPA-DD

Appendix 4: Further background information on ex ante calculation of emission reductions

Refer to section D.6.3. of this CPA-DD

Appendix 5: Further background information on monitoring plan

Refer to section D.7.2. of this CPA-DD
# History of the document

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Nature of revision(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>02.0</td>
<td>EB 66, 13 March 2012</td>
<td>Revision required to ensure consistency with the &quot;Guidelines for completing the component project design document form for small-scale component project activities&quot; (EB 66, Annex 17).</td>
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</table>

**Decision Class:** Regulatory  
**Document Type:** Form  
**Business Function:** Registration