

THIRD MONITORING REPORT

DATED 6th JANUARY, 2009

FOR THE PERIOD

01ST MAY 2007 TO 30th June 2008

VERSION 02

“Lohgarh, Chakbhai and Sidhana Mini Hydroelectric Projects”

Aqua Power Private Limited

Reference No.UNFCCC00000327 - CDMP

Project Location:

**Bhatinda Branch Canal, District Sangrur,
Punjab, India**

Aqua Power Private Limited

B-37, Sector-1, Noida – 201301

Uttar Pradesh, India

Fax No. 91-0120-4621333

Current Status of the Project

Three Mini Hydroelectric Power projects aggregating to 5.20 MW at Lohgarh, Chakbhai and Sidhana on the Bhatinda Branch canal, District Sangrur, Punjab, India have been set-up. Mini Hydroelectric Project at Lohgarh (2MW) was commissioned in October 2005, Chakbhai (2MW) was commissioned in November 2004 and Sidhana (1.20MW) was commissioned in October 2007. The plants are operating successfully.

The projects were completed with major equipment supplied by the supplier as under:

Table 1: Project Details

S.No.	MHP	Equipment	Qty	Supplier
1	Lohgarh	Turbine & its accessories	2	Boving Fouress Limited, Bangalore
		Synchronous Generator	2*1000 Kw	
2	Chakbhai	Turbine & its accessories	2	Boving Fouress Limited, Bangalore
		Synchronous Generator	2*1000 Kw	
3	Sidhana	Turbine & its accessories	1	Boving Fouress Limited, Bangalore
		Synchronous Generator	1*1200 Kw	

The promoters to the Company provided the entire equity and loan was funded by consortium of banks viz. Canara Bank, UTI Bank and Corporation Bank.

The name of the Company has been changed from “Aqua Power Limited” to “Aqua Power Private Limited”. The fresh certificate of incorporation and Host Country approval for the same has been received by the project activity. The records at CDM Registry with respect to the revised modalities of communication signed by all Project Participants have been updated.

During the present monitoring period i.e. 01st May 2007 to 30th June 2008, all the three (3) Plants achieved net energy generation of 34,297,318 kWh.

Statement to What Extent the Project has been Implemented as Planned

The projects were completed as planned and described in the Project Design Document (PDD).

The project at Lohgarh (2MW) is in operation continuously (with outages – forced & planned) since October 2005, Chakbhai (2MW) is in operation since November 2004 and Sidhana (1.2MW) is in operation since October 2007.

The purpose of the projects is to generate electricity by utilizing water flowing through the existing canal system.

The approved consolidated baseline methodology for the project is AMS-I.D, Version 07.

Monitoring Period

This is the third monitoring report associated with the project activity. The previous monitoring report covered the period from 20/11/2004 to 31/3/2006 (Both days included) and the second monitoring report covered the period from 1st April 2006 to 30th April 2007 (Both days included) and the CERs for the same have already been issued.

The period covered in this monitoring report is from 1st May 2007 to 30th June 2008 (Both days included). This monitoring report does not cover any period of time covered by the previous monitoring report.

Sustainability – Economic and Social Well-being

The project activity has resulted in sustainable development in the region as follows:

1. Generating clean power by utilizing water has helped in eliminating an equivalent carbon dioxide, sulphur dioxide, nitrogen oxides, SPM *etc.* which would have been otherwise generated to produce electricity.
2. Power generation from a renewable source like water has helped to substitute & conserve considerable amount of finite, non-renewable energy resource (coal & natural gas).
3. Project activity has resulted in creation of direct and in-direct employment in the vicinity.
4. Additional economic benefits have accrued by creation of business opportunity for local stakeholders such as villagers, local shop owners, small contractors, schools, hospitals, etc.
5. Project Area has been lighted with road reflectors and flash lights 24 hours a day which has provided security for the local people commuting in odd hours.
6. Project activity has contributed its share in reducing the demand-supply gap in the power deficit state of Punjab.
7. Helped in Up-gradation of old rural grids and strengthening of country's rural electrification coverage.
8. Helped in strengthening of existing irrigation canals, bridges, and roads by up-gradation of these structures.
9. Mechanical Trash racks and trash cleaning machines helped remove trash in the canal resulting in flow of clean water in the canal for irrigation and drinking purposes.
10. Project activity serves a small demonstrative project for clean renewable energy generation in the state. (As these projects are being the first private sector small hydropower projects in the state)
11. Project activity would also contribute to the state exchequer.

Obtained Parameters According to Monitoring Plan

For the project, following parameters were monitored on a continuous basis.

Energy:

- i. The Energy exported (kWh) and Energy imported (kWh) at the interconnection point have been measured from the electronic energy meters (i.e. Trivector Meters) installed at the interconnection points at all 3 (three) project schemes.
- ii. The Net saleable energy has been calculated as a difference between energy exported and energy imported. It is based on monthly joint meter readings.
- iii. Monthly joint meter readings were taken at interconnection point and certified by representatives of Aqua Power Private Limited (APPL) and the purchaser i.e. Punjab State Electricity Board (PSEB).
- iv. The joint meter readings were used to raise invoice for sale of net energy to PSEB.
- v. The energy generated has been measured by the energy meters installed at the generation end on an hourly basis.
- vi. The auxiliary energy consumption has been measured by the auxiliary energy consumption meters installed at the plant on an hourly basis.
- vii. The data of the aforesaid parameters are recorded on hourly basis which are summed into a daily reading.
- viii. The Daily readings were aggregated to monthly readings.
- ix. Monthly reports stating the energy exported, energy imported, energy generated and auxiliary energy consumption were prepared by shift-in-charge and verified by plant managers.
- x. The finance department cross checked the data provided by plant managers. \
- xi. The above mentioned parameters of the monitoring plan are being tabulated in
Table no-2 below:

xii.

Table 2: Monitoring Parameters as per Monitoring Plan

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 is archived data to be kept?	Comment
1	Energy	Energy exported	kWh	M	Monthly	Total	Paper	2 years after end of crediting period	This is monitored at interconnection point.
2	Energy	Energy imported	kWh	M	Monthly	Total	Paper	2 years after end of crediting period	This is monitored at interconnection point.
3	Energy	Net saleable energy	kWh	C	Monthly	Total	Paper	2 years after end of crediting period	This is calculated as difference of 1 and 2. It would be based on monthly bills raised by APPL to PSEB.
4	Energy	Energy generated	kWh	M	Hourly	Total	Paper	2 years after end of crediting period	This is monitored at generation end.
5	Energy	Auxiliary energy consumption	kWh	M	Hourly	Total	Paper	2 years after end of crediting period	This is monitored at the plant.

The month-wise data on energy generated is given in Table 3 below:

Table 3: Energy Generation (kWh)

Billing Month	Year	Chakbhai	Lohgarh	Sidhana	Total
May	2007	1312505	1118332	0	2430837
Jun	2007	1222430	1081868	0	2304298
Jul	2007	1445620	1261854	0	2707474
Aug	2007	1501615	1265797	0	2767412
Sep	2007	1436430	1225390	0	2661820
Oct	2007	363253	313856	44405	721514
Nov	2007	1171522	999918	646048	2817488
Dec	2007	1213535	1143571	771320	3128426
Jan	2008	1308785	1104632	791059	3204476
Feb	2008	1385825	1201202	760748	3347775
Mar	2008	1411820	1115631	805511	3332962
Apr	2008	420225	364316	286204	1070745
May	2008	1301385	1045334	849868	3196587
June	2008	641482	618040	344630	1604152
Total		16136432	13859741	5299793	35295966

The month-wise data on auxiliary energy consumption is given in Table 4 below:

Table 4: Auxiliary Energy Consumption

Billing Month	Year	Chakbhai	Lohgarh	Sidhana	Total
May	2007	27225	36562	0	63787
Jun	2007	24150	32688	0	56838
Jul	2007	28910	36354	0	65264
Aug	2007	29515	34887	0	64402

Sep	2007	28920	36180	0	65100
Oct	2007	8353	12036	4757	25146
Nov	2007	21242	35628	25152	82022
Dec	2007	23965	40921	27976	92862
Jan	2008	25535	38902	27811	92248
Feb	2008	26395	40182	26812	93389
Mar	2008	26570	35221	28007	89798
Apr	2008	8805	13096	11468	33369
May	2008	27405	34124	29484	91013
June	2008	14592	22570	15382	52544
Total		321582	449351	196849	967782

The energy generated data and auxiliary energy consumption data is not used for calculation of emission reductions since energy exported and energy imported data is available for the project activity.

Power Generation:

Month-wise data on Net Saleable Energy for the monitoring period is given in Table 5 below:

As per the Project Design Document, Emission reductions are to be calculated based on the energy exported minus energy imported during shut-down and start-ups by the power plant.

The Carbon emission reductions are zero at Sidhana from May 2007 to September 2007 for the monitoring period as the plant had not been commissioned due to unavailability of Canal Closure for completing the In-canal works and additional time-period required for the strengthening / raising of canal banks and remodeling of one village road bridge and one foot road bridge. The plant has been commissioned on 25th October 2007.

Table 5: Net Saleable Energy (kWh)

Billing Month	Year	Energy Exported				Energy Imported				Net Saleable Energy
		Chakbhai	Lohgarh	Sidhana	Total	Chakbhai	Lohgarh	Sidhana	Total	
May	2007	1285280	1081770	0	2367050	200	490	0	690	2366360
Jun	2007	1198280	1049180	0	2247460	220	440	0	660	2246800
Jul	2007	1416710	1225500	0	2642210	140	440	0	580	2641630
Aug	2007	1472100	1230910	0	2703010	230	490	0	720	2702290
Sep	2007	1407510	1189210	0	2596720	140	270	0	410	2596310
Oct	2007	354900	301820	39648	696368	2550	3450	128	6128	690240
Nov	2007	1150280	964290	620896	2735466	40	180	720	940	2734526
Dec	2007	1189570	1102650	743344	3035564	30	200	128	358	3035206
Jan	2008	1283250	1065730	763248	3112228	400	460	1184	2044	3110184
Feb	2008	1359430	1161020	733936	3254386	30	210	176	416	3253970
Mar	2008	1385250	1080410	777504	3243164	40	630	288	958	3242206
Apr	2008	411420	351220	274736	1037376	2760	3340	2944	9044	1028332
May	2008	1273980	1011210	820384	3105574	390	1240	512	2142	3103432
June	2008	626890	595470	329248	1551608	1080	2200	2496	5776	1545832
Total		15814850	13410390	5102944	34328184	8250	14040	8576	30866	34297318

Emission Reductions

Baseline Emissions:

Sn	Description	Formula	Unit	Value
A	Energy exported		kWh	34328184.00
B	Maximum inaccuracy specification in the meter		%	0.50%
C	Less: Maximum inaccuracy specification in the meter during the month of May 2007, December 2007 & January 2008 at MHP Lohgarh	$C = \text{Energy exported (May 07, Dec. 07 \& Jan. 08)} * 0.50\%$	kWh	16250.75 [#]
D	Less: Maximum inaccuracy specification in the meter during the month of August 2007 to October 2007 & April 2008 to June 2008 at MHP Chakbhai	$D = \text{Energy exported (Aug. 07 to Oct. 07 \& April to June 08)} * 0.50\%$	kWh	27734.00 [#]
E	Less: Maximum inaccuracy specification in the meter during the period October 2007 to June, 2008 at MHP Sidhana	$E = \text{Energy exported (October 07 to June. 08)} * 0.50\%$	kWh	25514.72 [#]
F	Energy exported based on maximum inaccuracy specification of the meters	$F = A - C - D - E$	kWh	34258684.53
G	Energy exported based on maximum inaccuracy specification of the meters – Considered		kWh	34258685.00
H	Energy imported		kWh	30866.00
I	Maximum inaccuracy specification in the meter		%	0.50%
J	Add: Maximum inaccuracy specification in the meter during the month of May 2007, December 2007 & January 2008 at MHP Lohgarh	$J = \text{Energy imported (May 07, Dec. 07 \& Jan. 08)} * 0.50\%$	kWh	5.75 [#]
K	Less: Maximum inaccuracy specification in the meter during the month of August 2007 to October 2007 & April 2008 to June 2008 at MHP Chakbhai	$K = \text{Energy imported (Aug. 07 to Oct. 07 \& April to June 08)} * 0.50\%$	kWh	35.75 [#]
L	Less: Maximum inaccuracy specification in the meter during the period October 2007 to June, 2008 at MHP Sidhana	$L = \text{Energy imported (October 07 to June. 08)} * 0.50\%$	kWh	42.88 [#]

M	Energy imported based on maximum inaccuracy specification of the meters	$M=H+J+K+L$	kWh	30950.38
N	Energy imported based on maximum inaccuracy specification of the meters Considered		kWh	30950.00
O	Net Saleable Energy	$O=G-N$	kWh	34227735.00
P	Carbon Emission Factor as per the baseline adopted		kg CO ₂ /kWh	0.942
Q	Baseline Emissions	$Q=(O \times P) / 1000$	ton CO ₂	32242.53

Baseline Emissions : 32242.53

Project Emissions : NIL

Emission Reductions : Baseline emissions – Project emissions

= 32242.53 – NIL

= *32242 tCO₂

The project proponent has applied a corrective action based on the maximum accuracy specification in the meter for energy exported and energy imported for the period May 2007, December 2007 & January 2008 for MHP Lohgarh and for the period August 2007 to October 2007 & April 2008 to June 2008 in MHP Chakbhai and for the period October 2007 to June 2008 at MHP Sidhana on account of delay in calibration of the electronic meters (i.e. Trivector Meter) during the aforesaid months. The same is in line with EB guidelines

http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_31GVV_BIQ27CCHO9J230KKXA2XNAR56

*As per the registered Project Design Document (PDD) the project activity had envisaged emission reductions of 82965, 108167 & 62334 tCO₂ (Total 253467 tCO₂) over a period of 9, 10 & 9 years respectively for MHP Lohgarh, MHP Chakbhai & MHP Sidhana based on the generation of 87.99, 114.72 & 66.11 million kWh units. In consideration of the above, the project activity would result into total emission reduction of 26961 tCO₂ based on generation of 9.78, 11.47 & 7.35 million kWh units over a period of 12 months respectively for MHP Lohgarh, MHP Chakbhai & MHP Sidhana.

During the current monitoring period the project activity has resulted into a total emission of 32242 tCO₂ based on the generation of 15.81, 13.40 & 5.09 million kWh units for MHP Lohgarh, MHP Chakbhai & MHP Sidhana respectively.

The higher generation during the current period as comparing with the generation envisaged in the registered PDD resulted into higher emission reductions during the current monitoring period due to the following reasons:

1. The current monitoring period under review is of 14 months (1st May 2007 to 30th June 2008). By taking into the consideration the current monitoring period, the project activity was had been resulted into a total emission of 31454 tCO₂ (26961/12 months*14 months) as per the registered PDD.
2. During the current monitoring period the project activity has achieved better energy generation, which has resulted into higher emissions of 32242 tCO₂ as against 31454 tCO₂ units of carbon emissions envisaged in the PDD due to the fact that estimated emissions reductions calculated in the PDD at the time of registration were based on PLF of 56%, 65% & 70% (average 63%) respectively for MHP Lohgarh, MHP Chakbhai & MHP Sidhana. However, during the current monitoring period the site at MHP Lohgarh, MHP Chakbhai & MHP Sidhana has achieved a PLF of 77%, 66% & 65% (average 70%) respectively due the better water availability in the canal. The PLF calculation as envisaged at the time of registration of PDD and actual PLF achieved is as under:

Calculation of PLF for generation envisaged in the PDD:

Sn	Particulars	Unit	Formula	MHP Lohgarh	MHP Chakbhai	MHP Sidhana	Total
1	Installed Capacity ("IC")	MW	A	2.00	2.00	1.20	5.20
2	Annual Gross Generation based on IC-per annum	Million kWh units	$B = (A * 1000 * 24 \text{ hrs.} * 365 \text{ days}) / 10^6$	17.52	17.52	10.51	45.55
3	Gross Generation as envisaged	Million kWh	C	87.99	114.72	66.11	268.82

	in the PDD	units					
4	Period of Gross Generation as considered in the PDD	Years	D	9.00	10.00	9.00	
5	Gross Generation as per PDD per annum	Million kWh units	$E=C/D$	9.78	11.47	7.35	28.59
6	PLF as per PDD	%	$F=E/B$	56%	65%	70%	63%

Calculation of actual PLF achieved during current monitoring period:

Sn	Particulars	Unit	Formula	MHP Lohgarh	MHP Chakbhai	MHP Sidhana	Total
1	Actual Generation achieved during the current monitoring period	Million kWh units	a	15.81	13.40	5.09	34.30
2	No. of months of operation	Months	b	14.00	14.00	9.00	
3	Actual PLF Achieved	%	$c=a/(B/12*b)$	77%	66%	65%	70%

Measures to Ensure the Results/Uncertainty Analysis

As per the Power Purchase Agreement (PPA), the energy exported to Punjab State Electricity Board (PSEB) is recorded from two independent set of meters – Main Meters and Check Meters. Reading of Main Meter is used for arriving at the figures of power exported and power imported.

In the event, the Main Meter is not in operation then reading from Check Meter installed at the grid substation of PSEB is used for billing. Till date the main meter only has been used for billing purposes.

Energy Generated, auxiliary consumption, energy exported and energy imported are being recorded daily and the same is being verified by Plant In charge. Since the hourly data logging is carried out along with daily reporting, the uncertainty level of the monitored data used for calculating emission reductions is low. The accuracy of the meters gets further automatically checked at the time of joint meter reading which is being taken every month by PSEB.

The following table indicates the details of Main Meter including their accuracy levels and calibration dates, Energy generation meter and Auxiliary energy meter for all three plants:

Table 6: Details of Trivector Meter, Generator Panel Meter and Auxiliary Energy Consumption Meter

Description	Lohgarh	Chakbhai	Sidhana
Trivector Meter			
Type	Electronic Bidirectional Trivector Meter	Electronic Bidirectional Trivector Meter	Electronic Bidirectional Trivector Meter
S.No.	4223075	4187462	4223080

Capacity; C.T. Ratio	200/5 A; 200/5 A M.F. - 1	200/5 A; 200/5 A M.F. - 1	125/5 A; 200/5 A M.F. -1.6
Accuracy level	(±) 0.50%	(±) 0.50%	(±) 0.50%
Make	L&T	L&T	L&T
Date of Calibration	10/10/2006 01/06/2007 15/01/2008 16/07/2008	24/02/2007 09/10/2007 28/06/2008	25/10/2007 #
Calibration Authority	PSEB Meter Mobile Testing Squad (MMTS) Ludhiana	PSEB Meter Mobile Testing Squad (MMTS), Patiala	PSEB Meter Mobile Testing Squad (MMTS), Patiala
Accuracy Level observed during calibration	(±) 0.26%	(+) 0.22%	-----
Uncertainty Level	Low	Low	Low
Energy Generation Meter			
Model	882-332	882-332	EM 6400
Make	Minsun	Minsun	Enercon
Serial No	Unit 1: 6851013 Unit 2 : 68B0512	Unit 1: 6851001 Unit 2 : 6790517	66927/3665-0605
Accuracy Level observed during calibration	(±) 1.00%	(±) 1.00%	(±) 1.00%

Uncertainty Level	Low	Low	Low
Auxiliary Energy Meter			
Model	EM 6400	EM 6400	EM 6400
Make	Enercon	Enercon	Enercon
Serial No	56248/1285-3404	E 64/1640-903	66927/3667-0605
Accuracy Level observed during calibration	(±) 1.00%	(±) 1.00%	(±) 1.00%
Uncertainty Level	Low	Low	Low

During the period under review no change has taken place in the Trivector Meter(s) installed at Lohgarh and Chakbhai and Sidhana.

(# : MHP Sidhana has got commissioned on 25th October 2007. First Calibration of the main meter fell due on 25th April, 2008. During the current monitoring period due to delay in the calibration, the project proponent had applied a corrective action by way of reducing gross energy exported and increasing energy imported by 0.5%. It may be mentioned that during monthly joint meter reading of energy export and energy import by the project activity, the comparison of main meter reading and check meter reading takes place. During the entire monitoring period the reading of main meter and check meter were found to be comparable.

Installation of Meters:

The Trivector meters have been installed in a temper proof strong steel compartment sealed at every open end. These compartments are again being kept under a completely closed & locked Meter Room made of RCC. The area where the meter room is located is completely fenced and protected by a barbed wire.

Calibration of Meters:

At the time of installation of the meters, the accuracy and other parameters are checked thoroughly by the manufacturer i.e. L&T and a test report is issued by L&T. The Trivector Meters are also checked for accuracy by PSEB Metering Equipment (ME) Laboratory, Patiala before installation at the site. The Meters which are within the permissible accuracy limits are jointly sealed by 2 officers of the rank of Sr. XEN (One from Sr. Ex. Engr., ME Division, Patiala and second from Sr. Ex. Engr., MMTS, Patiala).

Calibration of the Trivector Meters already in operation is carried out at site by PSEB Meter Mobile Testing Squad (MMTS), Patiala. The MMTS officer visits the site and issue a challan in respect to the confirmation of the accuracy of the meters. The date of calibration and signature of officer is indicated on the challan. These challans are laminated by a cellophane material and pasted as a seal on to the Meter Box itself.

In the event, the officer observes any fault in the meter, then the same is being replaced by the officer and a spare tested meter is installed. The faulty meter is then sent to the PSEB Metering Equipment (ME) Laboratory, Patiala wherein the same is tested and a test report is generated. The meter is again reinstalled by the engineer at the site.

Roles and Responsibilities

APPL was the sole agency responsible for implementation of the above monitoring report.