Monitoring report form
(Version 03.1)

Monitoring Report

Title of the project activity	Community-Based Renewable Energy Development in the Northern Areas and Chitral (NAC), Pakistan
Reference number of the project activity	UNFCCC Reference # 1713
Version number of the monitoring report	Version 01
Completion date of the monitoring report	6th May 2013
Registration date of the project activity	29th October 2009
Monitoring period number and duration of this monitoring period	02 (1st April 2011 – 31st March 2013)
Project participant(s)	Aga Khan Rural Support Programme (AKRSP) representing 90 participating communities. International Bank for Reconstruction and Development (IBRD) as Trustee of the Community Development Carbon Fund (CDCF); Netherlands' Ministry of Infrastructure and the Environment (lenM) BASF SE ; KfW Kommunalkredit Public Consulting GmbH Government of Canada - Ministry of Foreign Affairs and International Trade Maersk Olie og Gas A/S; DONG Naturgas A/S; Nordjysk Elhandel A/S; Danish Ministry of Climate and Energy - Danish Energy Agency Goteborg Energi AB Bruxelles Environnement - IBGE; Walloon Region: Walloon Air and Climate Agency Government of Italy - Ministry for the Environment, Land and Sea Kingdom of Spain - Ministry of Agriculture, Food and Environment and Ministry of Economy and Competitiveness; EDP - Energias de Portugal, S.A; Endesa Generación, S.A.; Gas Natural SDG, S.A.; Hidroeléctrica del Cantábrico, S.A. Statkraft Carbon Invest AS; Statoil ASA Ruukki Metals Oy The Okinawa Electric Power Co., Inc. ; Daiwa Securities Capital Markets Co. Ltd.; Fujifilm Corporation; Idemitsu Kosan Co., Ltd.; JX Nippon Oil & Energy Corporation Schweizerische Ruckversicherungsgesellschafts AG - Swiss Re Government of Luxembourg - Ministry of Sustainable Development and Infrastructure
Host Party(ies)	Government of Pakistan

Sectoral scope(s) and applied methodology(ies)	Sectoral scope: 1: Energy industries (renewable - /non-renewable sources) Applied methodology(ies): AMS-I.A. version 12 - Electricity generation by the user
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	163,928 tCO_2e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	21,494 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The project **"Community-Based Renewable Energy Development in the Northern Areas and Chitral (NAC), Pakistan"** is to invest in micro and mini hydropower projects (MHP) to serve remote rural communities in Gilgit-Baltistan *(previously known as Northern Areas)*,which has now been given internal autonomy and self governance under a Presidential Order, and now enjoys a quasi-provincial status and district Chitral Khyber-Pakhtunkhwa province *(previously known as N.W.F.P)*[1] , Pakistan. The project aims to generate electricity from 90 sub-projects ranging in size from 30 kW to 800 kW not exceeding 15 MW of total power. These sub-projects will supply electricity through local mini-grids, which will be isolated from any regional and national grids existing in the region. The projects will provide much needed power for meeting community energy needs at the same time substituting for the use of diesel fuel, thereby contributing to reduction of greenhouse gas emissions.

A.2. Location of project activity

The projects are located across the three regions, including Gilgit region (Gilgit, Ghizer, Hunza- Nagar and Astore districts), Baltistan region (Ghanche and Skardu districts), and Chitral region (district Chitral Khyber Pakhtunkhawa). Table A.1 shows the location of 53 sub-projects initiated in three regions, the provinces, districts and GPS Coordinates of individual project.

Table A.1: Names of 53 initiated projects, with location of Province, District and GPS Coordinates

ID. No.	Name of MHP Project	Province	District	GPS					
				DegN	MinN	SecN	DegE	MinE	SecE
1	Besil	Gilgit Baltistan	Skardu	35	52	20	74	45	42
2	Memushthang	Gilgit Baltistan	Skardu	34	42	28	76	9	37
3	Brep	Chitral	Chitral	36	25	51	72	40	1
4	Onawich	Chitral	Chitral	36	39	26	72	54	29
5	Bilphok	Chitral	Chitral	36	0	5	71	47	44
6	Terich Bala	Chitral	Chitral	36	20	47	72	0	
7	Kishmanja	Chitral	Chitral	36	48	41	73	12	22
8	Baleem Laspur	Chitral	Chitral	36	3	56	72	26	41
9	Overik	Chitral	Chitral	36	3	56.05	72	26	40.93
10	Chatpa Katisho	Gilgit Baltistan	Skardu	35	7	31	0.7	49	17.18
11	Ahmedabad	Gilgit Baltistan	Hunza	36	18	29	74	43	40.35
12	Hushay	Gilgit Baltistan	Ghanche	35	28	2.65	76	21	12.23
13	Izh	Chitral	Chitral	35	59	20	71	33	22
14	Dapa	Gilgit Baltistan	Skardu	35	6	48.31	75	45	54.88
15	Katisho	Gilgit Baltistan	Skardu	35	6	43.54	75	53	11
16	Memush	Gilgit Baltistan	Skardu	34	42	34.99	76	8	4.99
17	Bireer	Chitral	Chitral	35	38	38	71	41	41
18	Chowar	Gilgit Baltistan	Ghanche	34	55	0.58	0.76	42	0.76
19	Shahsalim	Chitral	Chitral	35	55	48.95	71	31	20.36
20	Hango	Gilgit Baltistan	Skardu	35	33	0.22	75	10	6.78
22	Gobor Merdeen	Chitral	Chitral	36	4	18	71	21	43
23	Doko	Gilgit Baltistan	Skardu	35	47	45	0.75	23	42
24	Haltanmosa Hargosil	Gilgit Baltistan	Skardu	34	45	23.8	76	4	34.88
25	Zhitur	Chitral	Chitral	35	54	25	71	29	56
26	Shagram	Chitral	Chitral	36	27	52	72	25	26
27	Beshgram	Chitral	Chitral	36	4	59	71	48	54
28	Diezgh	Chitral	Chitral	35	36	28	36.28	72	43
29	Begust	Chitral	Chitral	35	56	9	71	31	59
30	Whaat	Chitral	Chitral	36	35	59	8.25	71	30
31	Wazirpoor	Gilgit Baltistan	Skardu	35	30	24.85	75	36	33.02

32	Momi	Chitral	Chitral	36	2	21	71	42	59
33	Zondarngram	Chitral	Chitral	36	23	35.73	72	12	26.99
34	Sunich	Chitral	Chitral	36	2	50	71	45	46
36	Arkari	Chitral	Chitral	36	16	56	71	34	3
38	Yourjogh	Chitral	Chitral	35	58	26	71	33	3
43	Yalbo Sabsar	Gilgit Baltistan	Skardu	35	38	4.36	0.75	56	2.16
21	Shagarthang	Gilgit Baltistan	Skardu	35	39	22	75	45	40
35	Ganuk	Gilgit Baltistan	Skardu	34	46	55.07	76	24	51.3
37	Moorkhun	Gilgit Baltistan	Hunza	36	36	51	74	52	11.97
39	Lunkha	Gilgit Baltistan	Ghanche	35	53	48	76	28	1.08
40	Bargo	Gilgit Baltistan	Skardu	36	36	51	74	52	11.97
41	Arundu	Chitral	Chitral	35	18	35	71	32	52
42	Gartanza Shishkat	Gilgit Baltistan	Hunza	36	20	31.20	74	58	30.60
44	Handrap Saleemabad	Gilgit Baltistan	Ghizer	36	10	26	73	5	13
45	Susum	Chitral	Chitral	36	5	40	71	50	5
46	Koghuzi	Chitral	Chitral	35	56	21.45	71	56	15.19
47	Kiyar	Chitral	Chitral	36	6	4	71	51	16
51	Konar	Gilgit Baltistan	Skardu	34	38	1.50	75	48	59.91
52	Pawoor	Chitral	Chitral	36	34	59.5	72	49	03
53	Kunjokshal	Gilgit Baltistan	Hunza	36	26	27	74	71	14.6
55	Shogore	Chitral	Chitral	36	0	48	71	45	48
73	Birzeen	Chitral	Chitral	35	59	57	71	27	39
80	Raman-Harcheen	Chitral	Chitral	36	03	25.8	72	77	14.1

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	**Private and/or public entity(ies) project participants (as applicable)**	**Indicate if the Party involved wishes to be considered as project participant (Yes/No)**
Government of Pakistan (Host)	Aga Khan Rural Support Program (AKRSP) representing 90 participating communities.	No
Government of Netherlands	IBRD as the trustee of the Community Development Carbon Fund (CDCF); Netherlands' Ministry of Infrastructure and the Environment (lenM)	No
Germany	BASF SE ; KfW	No
Austria	Kommunalkredit Public Consulting GmbH	No
Canada .*Party withdrawn from KP effective 15/12/2012	Government of Canada - Ministry of Foreign Affairs and International Trade	Yes
Denmark	Maersk Olie og Gas A/S; DONG Naturgas A/S; Nordjysk Elhandel A/S; Danish Ministry of Climate and Energy - Danish Energy Agency	Yes
Sweden	Goteborg Energi AB	No
Belgium	Bruxelles Environnement - IBGE; Walloon Region: Walloon Air and Climate Agency	Yes
Italy	Government of Italy - Ministry for the Environment, Land and Sea	Yes

Spain	Kingdom of Spain - Ministry of Agriculture, Food and Environment and Ministry of Economy and Competitiveness; EDP - Energias de Portugal, S.A; Endesa Generación, S.A.; Gas Natural SDG, S.A.; Hidroeléctrica del Cantábrico, S.A.	Yes
Norway	Statkraft Carbon Invest AS; Statoil ASA	No
Finland	Ruukki Metals Oy	No
Japan	The Okinawa Electric Power Co., Inc. ; Daiwa Securities Capital Markets Co. Ltd.; Fujifilm Corporation; Idemitsu Kosan Co., Ltd.; JX Nippon Oil & Energy Corporation	No
Switzerland	Schweizerische Ruckversicherungsgesellschafts AG - Swiss Re	No
Luxembourg	Government of Luxembourg - Ministry of Sustainable Development and Infrastructure	Yes

A.4. Reference of applied methodology

The baseline and monitoring methodology applied to the project activity is as follows :

The baseline and monitoring methodology that applies for the project is based on the list of the small-scale CDM project activity categories contained in Appendix B of the Simplified Modalities and Procedures for Small-Scale CDM Project Activities.

The project falls under:
Type I – Renewable Energy projects

Category I A – Electricity Generation by the User, version 12

The approved baseline and monitoring methodology, given in Appendix B of the Simplified Modalities and Procedures for Small Scale CDM Project Activities, relevant to this project are available at:
http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_VECB8EZJV6NSM13KPOVCDLO9PBR4OY

A.5. Crediting period of project activity

The start date of the project activity is 3 March 2006. A seven years crediting period (renewable twice) is selected for the activity. The first crediting period is from 29 October 2009 to 28 October 2016. This monitoring report covers the period from 01 April 2011 to 31 March 2013.

SECTION B. Implementation of project activity

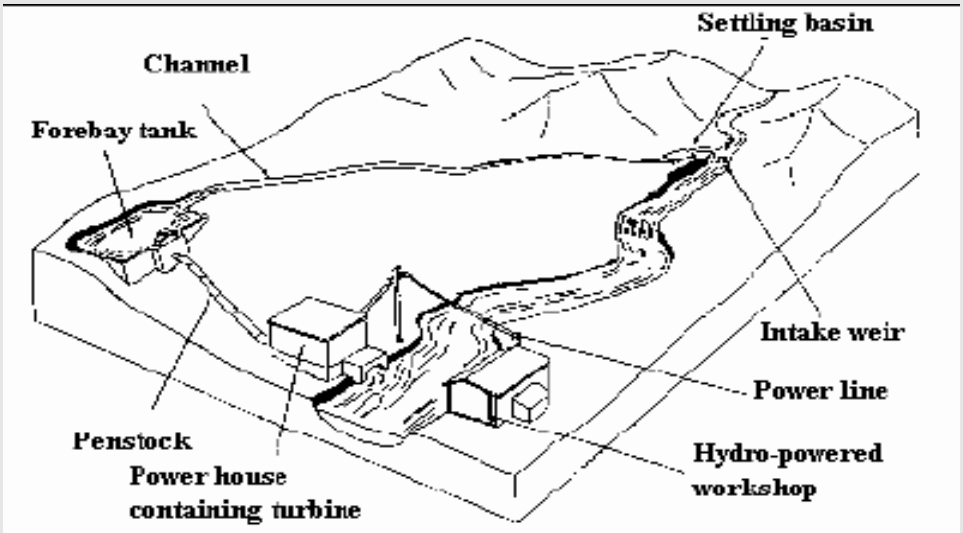
B.1. Description of implemented registered project activity

Micro and Mini Hydropower Technology
Micro and mini hydropower units offer a proven and reliable source of electricity in locations where the hydrological resources are available and the topography is favorable for their development. The turbine converts the energy of falling water to mechanical energy, which can be used directly or be converted to electrical energy, through an alternator, for use in lighting, refrigeration, milling or a number of other small productive uses. The basic components of all completed mini-micro hydropower units in Gilgit-Baltistan and

Chitral have been summarized as:

- Water from stream is diverted into the power channel, through temporary **diversion/intake**;
- Silt and other particulate material (if there is any) in the water settle in the **settling basin**;
- **Power channel,** that conveys water from the intake to the fore-bay tank;
- **Waste way,** carrying overflowing water from the fore-bay tank back to the stream.
- **Penstock pipe** transports water from fore-bay tank to the powerhouse;
- **Turbine,** (Cross Flow and/or Pelton) in the powerhouse converts the energy of the falling water into mechanical/rotational energy;
- **Generator,** (Alternator) in the powerhouse converts mechanical/rotational energy into electricity;
- **Governor and/or Electric Load Controller (ELC)** keeps the frequency and system voltage at constant levels in response to changes in load demand;
- **Tailrace channel,** to run the water from powerhouse back to the stream;
- **Panel Board,** in the powerhouse regulates and records the voltage and frequency;
- **kWh meter/Energy Meter,** records the energy supplied and consumed by the beneficiary households in the villages;
- **Step up Transformer** and power lines (11 KVA) transfer power to load centers;
- **Step down Transformers** at load centers distribute the power to the households and consumers at tail end.

In the following diagram, a schematic diagram of a typical mini/micro hydropower has been given.



Source http://en.howtopedia.org/wiki/How_to_Plan_a_Micro_Hydro-power_Plant

Table B1.1 lists the Micro Hydel Power plants, which are included in the monitoring report. Table B1.2 indicates the micro hydel power plants, which have been constructed but not yet operational (thus not included in this Monitoring Report). Table B1.3 indicates the projects, which are in the construction phase and Table B1.4 lists the power plants which are yet to be constructed.

Table B.1.1		List of Operational Projects that included in the ER Calculation in this Monitoring Report						
ID. No.	Region	Name of MHP Project	Capac. (kW)	Date of Initiation	Date of Completion	Meter ID Number	Date of Installation/Calibration	Next Calibration Date
1	Skardu	Besil	200	May 29,2006	Dec 30 ,2008	272756	06-Oct-12	05-Oct-14
2	Skardu	Memushthang	50	Nov 18,2006	Oct 15,2007	71132	20-Mar-12	19-Mar-14
3	Chitral	Brep	200	Dec 28,2005	Dec,2007	7105	18-Oct-11	17-Oct-13
4	Chitral	Onawich	50	May 06,2006	Jun 30,2007	7107	04-Apr-12	3-Apr-14
5	Chitral	Bilphok	50	Sep 28,2006	Jun 30,2007	12078	13-Jul-12	12- Jul-14
6	Chitral	Terich Bala	80	Sep 24,2007	Jun 01,2008	672117	10-Jul-11	9-Jul-13
7	Chitral	Kishmanja	50	Oct 25,2007	Jun 01,2008	11982	15-Apr-12	14-Apr-14
8	Chitral	Baleem Laspur	80	Oct 24,2007	Jun 01,2008	7110	5-Apr-12	4-Apr-14

9	Chitral	Overik	50	Oct 24,2007	Jun 01,2008	4081	08- Jun-12	07- Jun-14
10	Skardu	Chatpa Katisho	100	Feb 20,2008	Dec 30,2009	362472	13-Dec-12	12-Dec-14
11	Gilgit	Ahmedabad	400	May23,2006	Jun 30,2009	866437	01-Jun-12	31-May-14
12	Skardu	Hushay	160	Nov 9,2007	Apr 10,2009	9512929	18-Nov-12	17-Nov-14
13	Chitral	Izh	108	Sep 22,2008	Jan 17,2009	4083	15-Dec-12	14- Dec-14
14	Skardu	Dapa	160	Oct 12,2008	Jun 30,2009	9511401	14-Oct-12	13-Oct-14
15	Skardu	Katisho	100	Apr 30,2008	Dec 30,2008	866067	16-Apr-12	15-Apr-14
16	Skardu	Memush	30	Mar 18,2008	May 30,2009	71130	21- Mar-12	20-Mar-14
17	Chitral	Bireer	80	Jul 04,2008	Jan 04,2009	4085	2-Jul-12	01- Jul-14
18	Skardu	Chowar	160	Feb 27,2008	31Dec,2009	866438	26-Sep-12	25-Sep-14
19	Chitral	Shahsalim	50	Jul 03,2008	Jan 03,2009	692497	10-Jun-12	09-Jun-14
20	Skardu	Hango	100	Dec 30,2007	Jun 01,2010	9511400	14-Jan-11	12-Jan-13
22	Chitral	Gobor Merdeen	108	Apr 06,2009	Dec 03,2011	7104	1-Jan-12	31-Dec-14
23	Skardu	Doko	150	Mar 06,2009	Dec 15,2011	9511852	20-Dec-11	19-Dec-13
24	Skardu	Haltanmosa Hargosil	120	Nov 29,2008	Jun 02,2010	9511399	08-Dec-12	07-Dec-14
25	Chitral	Zhitur	108	Mar 13,2008	Jun 01-2010	4086	11- Aug-12	10- Aug-14
26	Chitral	Shagram	168	Nov 11,2008	Jun 01,2010	9511843	08-Dec-12	07-Dec-14
27	Chitral	Beshgram	200	Nov 08,2008	Jun 01,2010	9511552	4-Dec-12	03-Dec-14
28	Chitral	Diezgh	240	Nov 12,2008	Apr 01,2010	9511186	25-Jun-12	24-Jun-14
29	Chitral	Begust	108	Mar 13,2008	Jan 01,2010	4082	02-Aug-12	01-Aug-14
30	Chitral	Whaat	108	Apr 06,2009	Jun 01,2010	9511848	07-Dec-12	06- Dec-14
31	Skardu	Wazirpoor	100	Feb 19,2009	Jun 03,2010	9511187	03-Nov-12	02-Nov-14
32	Chitral	Momi	240	Nov 08-2008	May 01,2010	7103	21-Nov-11	20-Nov-13
33	Chitral	Zondarngram	240	Apr 06,2009	Aug 01-2010	9511245	15-Dec-12	14-Dec-14
34	Chitral	Sunich	125	Nov 08,2008	May 01-2010	9511846	8-Dec-12	7-Dec-14
36	Chitral	Arkari	320	Nov 08,2008	Aug 30, 2011	7101	19-Jan-12	18-Jan-14
38	Chitral	Yourjogh	160	Mar 13,2008	Aug 18-2012	7102	25-Oct-12	24-Oct-14
43	Skardu	Yalbo Sabsar	200	Mar 06,2009	Sep 25,2011	9511849	1-Oct-11	30 – Sep -13
45	Chitral	Susum	108	Oct 14, 2010	Oct 20, 2012	87243	4-Jan-13	3-Jan-15
		Total (kW)	**5,061**					

Table B.1.2		**List of Projects where construction is completed but yet not Operational**					
ID. No.	**Region**	**Name of MHP Project**	**Capacity (kW)**	**Date of Installation**	**Date of Completion**	**%age Progress**	**Expected Date of Completion**
21	Skardu	Shagharthang	100	Oct 07, 2007	Dec 30, 2010	100%	May 01,2013
35	Skardu	Ganuk	150	Oct 14, 2010	Dec 31, 2012	100%	Jun 01,2013
37	Gilgit	Moorkhun	400	Feb 27, 2008	Dec 15, 2012	100%	May 01,2013
39	Skardu	Lunkha	100	Oct 14, 2010	Dec 31, 2012	100%	Jun 01,2013
42	Gilgit	Gartanza	400	Mar 06, 2009	Nov 30, 2012	100%	May 01,2013
46	Chitral	Koghuzi	160	Mar 28, 2009	Nov 25, 2012	100%	Apr 01,2013
		Total	**1,310**				

Table B.1.3		**Projects, which are currently under construction**					
ID. No.	**Region**	**Name of MHP Project**	**Capacity (kW)**	**Date of Initiation**	**Date of Completion (Contractual)**	**%age Progress**	**Expected Date of Operation**
40	Gilgit	Bargo	300	14-Oct-10	30-Oct-11	55%	30-Oct-13

41	Chtral	Arundu	216	18-Jun-09	1-Jul-11	60%	30-May-13
44	Gilgit	Handrap	200	5-Feb-11	30-Sep-11	75%	30-May-13
47	Chitral	Kiyar	108	14-Oct-10	1-May-11	40%	30-Aug-13
51	Skardu	Konar	108	1-June-12	30-Oct-13	35%	30-Oct-13
52	Chitral	Pawoor	800	3-July-11	30-Oct-13	50%	30-Oct-13
53	Gilgit	Kujokshal	240	16-July-12	30-Aug-13	15%	30-Nov-13
55	Chitral	Shogore	500	3-Dec-10	30-Jun-12	50%	30-Jun-13
73	Chitral	Birzeen	250	14-Oct-10	30-Mar-12	70%	30-Apr-12
80	Chitral	Raman Harcheen	500	5-July-11	30-Oct-13	50%	30-Oct-13
		Total (kW)	**3,222**				

Table B.1.4: Projects construction not yet started

ID. No.	Region	Name of MHP Project	Capacity (kW)
48	Chitral	Mastuj	150
49	Chitral	Rau Gole Shuist	175
50	Chitral	Bhoroghol	50
54	Gilgit	Shamashal	125
56	Gilgit	Mir Malik	108
57	Chitral	Gasht	200
58	Chitral	Madaklashd	250
59	Chitral	Parabeg	250
60	Chitral	Parsan Munoor	108
61	Gilgit	Barkulti Par	75
62	Chitral	Gazeen	150
63	Chitral	Droshp	500
64	Chitral	Shonoghor Chitisar	75
65	Chitral	Rosh Gole Khot Payeen	125
66	Chitral	Sarghoz Yarkhun Lasht	75
67	Chitral	Ursoon	50
68	Gilgit	Bulachi	75
69	Chitral	KuzhBala	108
70	Chitral	KhotBala	125
71	Chitral	Hinjeel Gobobakh	125
72	Chitral	RechBala	250
74	Chitral	Bomborait	220
75	Chitral	Rabat Arkar	75
76	Chitral	Rowa	108
77	Chitral	Rach Payeen Miragaram Yarkhoon	200
78	Chitral	Oveer Arkari	125
79	Chitral	GolainIstore	108
81	Chitral	Chuinj Melp	108
82	Chitral	Langole Ujonu	250
83	Chitral	Rumboor	250
84	Chitral	Ghoru	125
85	Chitral	Besti Shenjure	150

86	Chitral	Chapali	150
87	Chitral	Zhupoo Melp	108
88	Chitral	Bang Ashrate	108
89	Chitral	Sore Laspur	125
90	Chitral	Phasti	48
		Total (kW)	**5,407**

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan or applied methodology

Not applicable

B.2.2. Corrections

Not applicable

B.2.3. Permanent changes from registered monitoring plan or applied methodology

Not applicable

B.2.4. Changes to project design of registered project activity

After 1st Verification visit the project PDD has been revised and revisions are approved by the UNFCCC on 13 September 2012. Initially 103 Microhydel power plants had to be constructed, but after the revision of the PDD, now 90 mini and micro hydel power plants will be constructed without exceeding 15 MW cumulative generation capacity. Out of 90 projects construction has been started on 53 projects out of which 37 projects are operational and included in this Monitoring Report for verification of DOE.

B.2.5. Changes to start date of crediting period

Not applicable

B.2.6. Types of changes specific to afforestation or reforestation project activity

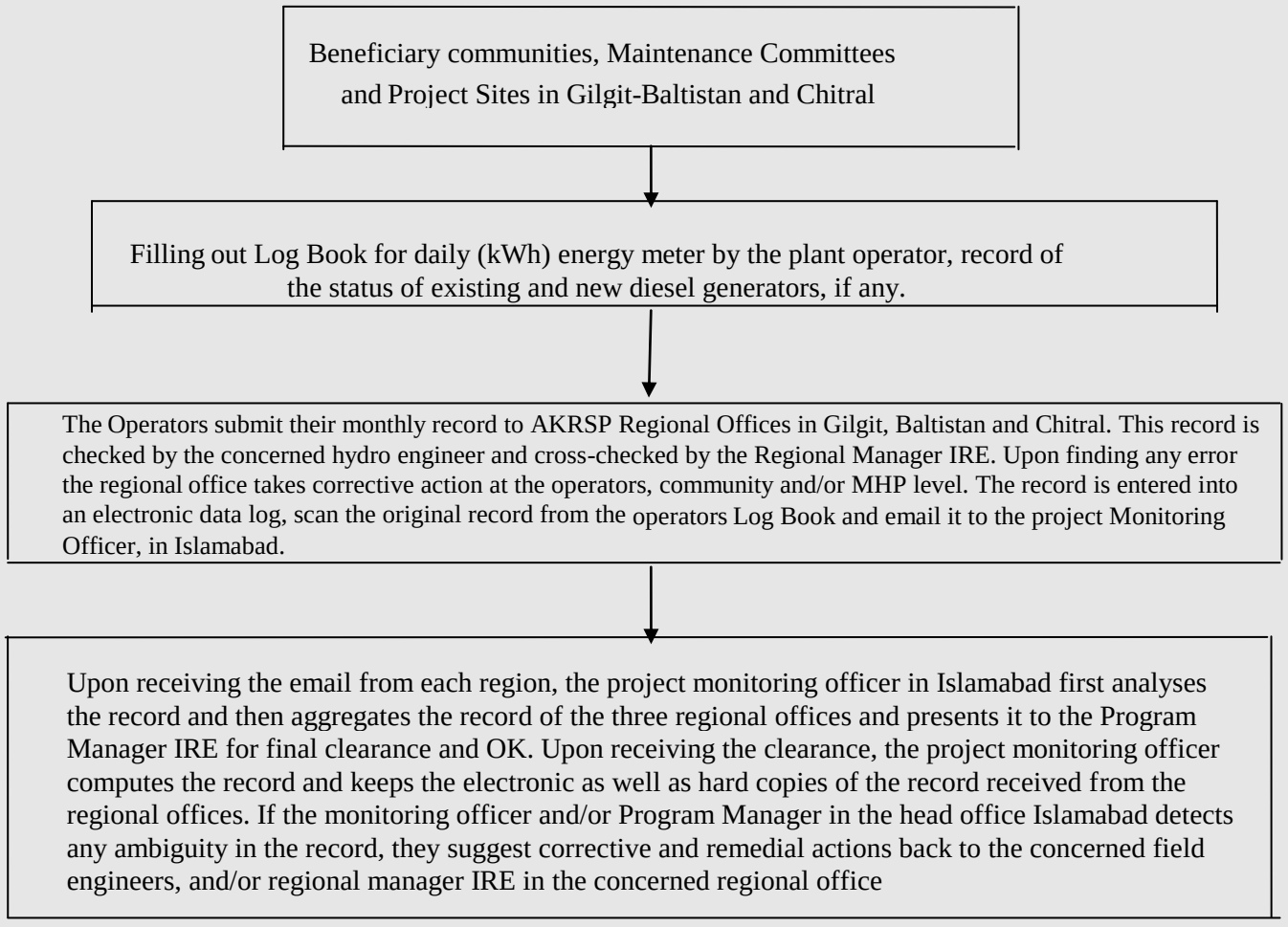
Not applicable

SECTION C. Description of monitoring system

Monitoring system of *"Community-based Renewable Energy Development in the NAC"* project consist of filling out the *Log Book* each day by power house operators in each project site, with the reading from the energy (kWh) meters, situated in the power houses, for each of the commissioned and operational power plant. The meter readings recorded in the *Log Book* by each operator submitted to AKRSP regional offices located in Gilgit, Skardu and Chitral on a monthly basis. The AKRSP regional offices are collecting the *Log Book* data sheets, and enter them electronically for the projects in their respective regions. The data is kept in the regional office in hard as well as soft forms. The electronically entered data and scanned copies of operators Log Book are then sent by email to the project monitoring officer in Islamabad, who is adding up the energy production each month for all power plants included in the CDM project. The monitoring officer verifies the data from the scanned copies of Log Book and data electronically entered at regional offices and computes the data on aggregate energy production of all the

power plant on monthly and annual basis. After necessary verification the hard copies of data generated are also signed by the concerned engineer in each of the three regional offices followed by the monitoring officer in Islamabad. All the data is stored in hard copies and in an electronic data log at the three regional offices as well as in Islamabad office. The data is regularly updated and will be available for verification of the DOE. Monthly readings at each plant are monitored by AKRSP and site visits are made by the field engineers for investigation in case of unusual variation in the meter readings.

AKRSP has developed a comprehensive CDM Project Monitoring Register/Log-Book to record the kWh meter reading, status of existing diesel generators in each project site. This Log Book is also to record status of new Generators purchased for the project villages and/or any diesel generators sold outside the project village to keep the record of project leakages. The Log Book also records new businesses initiated in the project village after commissioning of the MHP units. Record kept by the plant operators is duly certified by the maintenance committee of each project, with comments of the concerned field engineer on it. The plant operator submits this record to the AKRSP regional offices every month, along with kWh meter readings. The regional offices keep the monthly record of status of diesel generators in each project village. The three regional offices scan the original record from the operators and pass it on to the Project Monitoring Officer in Islamabad. This record is kept both in soft and hard forms in the regional as well as Islamabad office for verification of DOE. Before passing the record to project monitoring officer based in Islamabad, the record is also cross-checked by the concerned Regional Manager, Infrastructure and Renewable Energy (IRE) in the respective regional offices. This is for two purposes: first to take corrective action if there is any variation in the record and second is to instruct the field engineer to take remedial action in case of any indication of unnecessary variation in meter readings detected in any unit. The concerned engineer and/or Project Monitoring Officer verifies the record before putting it into the project files. The record maintained by the project monitoring officer in Islamabad is also cross checked by the Program Manager CPI/CDM, randomly and suggest appropriate actions, wherever it is necessary AKRSP's field engineers and operators have been trained to assess any malfunctioning of the energy meters, turbines, alternators, panel boards and to take action for rectifying the problems. The monitoring steps for CDM are as under:



Management structure for monitoring: The Program Manager IRE based in Islamabad is responsible for overall implementation of the project activities. The Program Manager reports to the CEO of AKRSP. The project monitoring officer, is responsible for record keeping and data consolidation and she reports to the Program Manager IRE. The three regional managers of IRE in the three regional offices are responsible for daily operations of the projects. The managers administratively report to the Regional Program Managers in their respective regions and are technically report to the Program Manager IRE based in Islamabad. A pool of engineers and sub engineers (hydropower/electrical, mechanical and civil cadres) in each regional office report to the Regional Manager IRE. The field engineers are directly responsible to supervise the field operations and providing guidance to the projects committees, maintenance committees, plant operators, village organizations (VOs), women's organizations (WOs) and beneficiary communities. The communities and operators directly approach the Regional Manager IRE and Regional Program Manager in each regional office for various matters related to the projects in their catchments. Moreover, male and female social mobilizers are work with the project communities, through local support organizations (LSOs). LSOs are legal intermediary institutions evolved from the federation of VOs, WOs, Civil Society Organizations and representation of elected representatives in each union council. The LSOs have their offices located in their catchments with a few paid staff. Communication channels of AKRSP staff with all tiers of community institutions are open as and when a need for meeting arises.

AKRSP has provided appropriate training to the engineers, data operators and plant operators in data monitoring, data entry and recording both in soft and hard form. AKRSP has trained the field engineers to asses any malfunctioning of the energy meters and to take action on rectifying the problems. AKRSP's Regional and Islamabad Office staff members in charge of the database have received training on entering data from log books into the database (excel sheets), electronic logging of information, analysis of this information, and production of regular reports.

AKRSP is monitoring the connections of the micro hydropower projects, included under the CDM activity, to the grid. So far no connection to the national grid has occurred. Any MHP that opts to connect to the national grid, which may be extended to the project area in the future, will be excluded from the project.

Leakage is monitored by preparing an inventory of all diesel gensets being used in each community where a micro- hydropower project is being installed and monitoring that they are either scrapped or remain in the community as back-up generators after the MHP starts operation. The communities if purchase any generator for these purposes before it gets sold outside the community as per the Terms of Partnership with AKRSP. Should any gensets be sold outside the project boundary, in violation of the TOP, the leakage emissions is monitored by AKRSP and records kept for verification by the DOE.

It will not be necessary to monitor the actual amount of kWh produced by back up gensets which remain inside the project boundary. Any kWh produced as backup power generated by diesel gensets remaining in the communities, either during the hours when the hydel is not operational or not producing sufficient power to meet all community needs, will be considered as the component of the baseline emissions which would also exist in the project scenario and would thus cancel out. The energy from the micro-hydropower project which is not supplied to the user of the back-up generator, during its operation, will not be recorded at the kWh meter in the power house and will thus not be recorded as baseline emissions. As the monitoring methodology being used for the project is to record the actual kWh being produced by the MHP, it will thus not be necessary to monitor the kWh produced by back up diesel gensets which remain with the project boundary. Also, please note that no diesel generators are used to start-up the MHPs as the MHP plants use small ―self-exciting alternators.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data / Parameter:	Emission factor of operating diesel gensets
Unit:	kg CO_2eq /kWh
Description:	This emission factor was derived from the results of a survey of existing diesel generator sets operating in the region where the project activity is to be carried out.
Source of data:	Survey of existing generator sets
Value(s) applied):	1.24 kg CO_2eq /kWh
Purpose of data:	The emission factor is used to calculation of baseline emissions.
Additional comment:	

D.2. Data and parameters monitored

Data / Parameter:	Energy production by each power plant
Unit:	kWh (kilowatt hour)
Description:	Three phase kWh (energy) meters at each power house measure energy supplied to the distribution system of the mini grid
Measured/ Calculated / Default:	As per actual daily reading
Source of data:	Log book placed at each power house
Value(s) of monitored parameter:	4,624,121 kWh (1 April 2011 – 31 December 2011) 7,326,920 kWh (1 January 2012 – 31 December 2012) 1,919,007 kWh (1 January 2013 – 31 March 2013)
Monitoring equipment:	For all commissioned projects high quality three-phase energy (kWh) meters manufactured by Syed Bhais (Pvt.) Ltd, Pakistan has been used in each powerhouse to record the total power supplied to the beneficiary communities. Syed Bhais is ISO-9000: 1994 Certified by DNV International in 1999 and ISO-9000:2000 by RWTUV in 2002. Syed Bhaies energy meters are also approved by Water and Power Development Authority (WAPDA) Pakistan for its projects. As a standard practice all meters are calibrated and stamped by Syed Bhais before selling it in the market. The standard requirement set for the next calibration is two years of use. The meters will be calibrated once they will achieve two years of use and/or detection of any error in readings.

Measuring/ Reading/ Recording frequency:	As per actual daily reading
Calculation method (if applicable):	Current Transformers (CT) has been installed in the panel boards to regulate the current. In the CT operated panel boards, the CT ratio is embedded on the CTs fixed in the panel boards. According to the requirement of manufacturer (Syed Bhais), the kWh meter reading has to be multiplied with the CT ratio to get the actual kWh readings. The CT ratio is more than 1, in projects above 100 kW.
QA/QC procedures:	Regular monitoring of the schemes is carried out during and after construction by AKRSP to ensure high quality construction and sustainable operation of the MHP schemes. AKRSP is carefully monitoring the monthly energy production, status of diesel generators and end-uses data submitted by each unit and providing guidance to improve the load factor and increase energy use in the productive uses.
Purpose of data:	Energy production by each plant is used along with the emission factor to calculate the baseline emissions reductions and derive the emissions reductions for the monitoring period.
Additional comment:	

Data / Parameter:	Energy production by new diesel gen set purchased in the project boundary
Unit:	kWh (kilowatt hour)
Description:	If new diesel generator sets are purchased by participating communities in the project boundary, due to increasing demand, long-term failure of hydro plants, these will be considered as project emissions. For this monitoring period, two new diesel generators were purchased in Village Izh 108 kW MHP Project and used in the Micro Finance Bank (4.8 kW) and the Community Center (1.2 kW).
Measured/ Calculated / Default:	Measured
Source of data:	A log book associated with each diesel gen set will be maintained by the operator
Value(s) of monitored parameter:	1,397.09 kWh (1 April 2011 – 31 December 2011) 1,579.20 kWh (1 January 2012 – 31 December 2012) 38.4 kWh (1 January 2013 – 31 March 2013)

Monitoring equipment:	The operator will keep daily logs of kWh produced through diesel gen sets. At the end of the month, the operator will send this information to the AKRSP office, where this information will be compiled for all sites, where the gen-sets are used. All the data will be consolidated and stored in an electronic data log at the AKRSP office. The data will be regularly updated and shared with the DOE to enable verification of ERs.
Measuring/ Reading/ Recording frequency:	Daily reading, monthly recording
Calculation method (if applicable):	Not applicable
QA/QC procedures:	Power output of each diesel genset will be verified by AKRSP field engineers during routine field visits to the project sites. AKRSP will coordinate and monitor the monthly diesel gen set energy production and end-uses data submitted by each of the participating communities. AKRSP will also train the diesel gen set operators in maintaining the kWh reading.
Purpose of data:	Produced electricity is used along with the diesel gensets emission factor to calculate the project emissions. In fact, these diesel gensets are as used back-up by the consumers and their outputs don't flow through the meter as used to record the power output of the hydropower plant. Hence, their emissions are not actual project emissions (as per the monitoring requirements), but for conservativeness, the project participant deducts them from the emissions reductions.
Additional comment:	

Table **MHP Projects kWh Generation status and Meter Calibration Schedule**

ID. No.	Region	Name of MHP Project	Capacity (kW)	Date of Initiation	Date of Completion	Meter ID Number	Date of Installation/ Calibration	Next Calibration Date	Generation-kWh 1st April, 2011- 31st March, 2013
1	Skardu	Besil	200	May 29,2006	Dec 30 ,2008	272756	06-Oct-12	05-Oct-14	110,304
2	Skardu	Memushthang	50	Nov 18,2006	Oct 15,2007	71132	20-Mar-12	19-Mar-14	105,671
3	Chitral	Brep	200	Dec 28,2005	Dec,2007	7105	18-Oct-11	17-Oct-13	613,440
4	Chitral	Onawich	50	May 06,2006	Jun 30,2007	7107	04-Apr-12	3-Apr-14	78,522
5	Chitral	Bilphok	50	Sep 28,2006	Jun 30,2007	12078	13-Jul-12	12- Jul-14	403,550
6	Chitral	Terich Bala	80	Sep 24,2007	Jun 01,2008	672117	10-Jul-11	9-Jul-13	269,261
7	Chitral	Kishmanja	50	Oct 25,2007	Jun 01,2008	11982	15-Apr-12	14-Apr-14	38,615
8	Chitral	Baleem	80	Oct 24,2007	Jun 01,2008	7110	5-Apr-12	4-Apr-14	471,949
9	Chitral	Overik	50	Oct 24,2007	Jun 01,2008	4081	08- Jun-12	07- Jun-14	390,350
10	Skardu	Chatpa	100	Feb 20,2008	Dec 30,2009	362472	13-Dec-12	12-Dec-14	65,659
11	Gilgit	Ahmedabad	400	May23,2006	Jun 30,2009	866437	01-Jun-12	31-May-14	1,311,176
12	Skardu	Hushay	160	Nov 9,2007	Apr 10,2009	9512929	18-Nov-12	17-Nov-14	211,672
13	Chitral	Izh	108	Sep 22,2008	Jan 17,2009	4083	15-Dec-12	14- Dec-14	779,310
14	Skardu	Dapa	160	Oct 12,2008	Jun 30,2009	9511401	14-Oct-12	13-Oct-14	498,400

15	Skardu	Katisho	100	Apr 30,2008	Dec 30,2008	866067	16-Apr-12	15-Apr-14	441,904
16	Skardu	Memush	30	Mar 18,2008	May 30,2009	71130	21- Mar-12	20-Mar-14	21,796
17	Chitral	Bireer	80	Jul 04,2008	Jan 04,2009	4085	2-Jul-12	01- Jul-14	277,722
18	Skardu	Chowar	160	Feb 27,2008	31Dec,2009	866438	26-Sep-12	25-Sep-14	308,511
19	Chitral	Shahsalim	50	Jul 03,2008	Jan 03,2009	692497	10-Jun-12	09-Jun-14	73,144
20	Skardu	Hango	100	Dec 30,2007	Jun 01,2010	9511400	14-Jan-11	12-Jan-13	111,048
22	Chitral	Gobor	108	Apr 06,2009	Dec 03,2011	7104	1-Jan-12	31-Dec-13	176,220
23	Skardu	Doko	150	Mar 06,2009	Dec 15,2011	9511852	20-Dec-11	19-Dec-13	314,672
24	Skardu	Haltanmosa Hargosil	120	29-Nov-08	2-Jun-10	9511399	08-Dec-12	07-Dec-14	389,739
25	Chitral	Zhitur	108	Mar 13,2008	Jun 01-2010	4086	11- Aug-12	10- Aug-14	516,137
26	Chitral	Shagram	168	Nov 11,2008	Jun 01,2010	9511843	08-Dec-12	07-Dec-14	482,728
27	Chitral	Beshgram	200	Nov 08,2008	Jun 01,2010	9511552	4-Dec-12	03-Dec-14	592,576
28	Chitral	Diezgh	240	Nov 12,2008	Apr 01,2010	9511186	25-Jun-12	24-Jun-14	460,092
29	Chitral	Begust	108	Mar 13,2008	Jan 01,2010	4082	02-Aug-12	01-Aug-14	544,102
30	Chitral	Whaat	108	Apr 06,2009	Jun 01,2010	9511848	07-Dec-12	06- Dec-14	750,249
31	Skardu	Wazirpoor	100	Feb 19,2009	Jun 03,2010	9511187	03-Nov-12	02-Nov-14	414,584
32	Chitral	Momi	240	Nov 08-2008	May 01,2010	7103	21-Nov-11	20-Nov-13	587,020
33	Chitral	Zondarngram	240	Apr 06,2009	Aug 01-2010	9511245	15-Dec-12	14-Dec-14	526,056
34	Chitral	Sunich	125	Nov 08,2008	May 01-2010	9511846	8-Dec-12	7-Dec-14	315,432
36	Chitral	Arkari	320	Nov 08,2008	Aug 30, 2011	7101	19-Jan-12	18-Jan-14	494,901
38	Chitral	Yourjogh	160	Mar 13,2008	Aug 18-2012	7102	25-Oct-12	24-Oct-14	230,640
43	Skardu	Yalbo Sabsar	200	Mar 06,2009	Sep 25,2011	9511849	1-Oct-11	30 -Sep -13	438,416
45	Chitral	Susum	108	Oct 14,2010	Jan 04,2013	87243	4- Jan-13	3-Jan-15	54,480

D.3. Implementation of sampling plan

Not Applicable.

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

EB = annual energy baseline in kWh per year

Σi= the sum over the group of "i" renewable energy technologies (e.g. solar home systems, solar pumps) implemented as part of the project.

Oi = the estimated annual output of the renewable energy technologies of the group of "i" renewable energy technologies installed (in kWh per year)

l = average technical distribution losses that would have been observed in diesel powered mini-grids installed by public programs or distribution companies in isolated areas, expressed as a fraction. As per the registered PDD, technical distribution losses on mini-grid distribution systems = 0.2

The aggregation of the annual kWh meter readings of all the micro-hydro systems give the (ΣiOi)

The annual energy baseline in kWh per year (EB) comes out to be the sum of all the annual meter readings at the hydel power houses divided by (1-0.2), to take into account the avoided transmission losses from locally generated power

The annual energy baseline (EB) includes 37 projects operational during the monitoring period.

ΣiOi = 13,870,048 kWh

EB= 13,870,048 / (0.8) = 17,337,560 kWh

Total annual emission reductions can be calculated by multiplying EB by the emission coefficient of the displaced fuel. An emission coefficient of 1.24 kg CO2eq/kWh is used in the calculations as discussed in Section B.4 of the PDD.

Baseline Emissions (tCO2/yr) = EB (kWh) * 1.24 kg CO2eq/kWh * 1/1,000

= 17,337,560 * 1.24 * 1/1000

= 21,498 tCO_2

E.2. Calculation of project emissions or actual net GHG removals by sinks

Project Emissions (tCO2/yr) = 0 (default)

Project Emissions (tCO2/yr) = EP (kWh) * 1.24 kg CO2eq/kWh * 1/1000 (only case of new diesel gen-sets being purchased)

According to the previous monthly monitoring reports from the field, in January 2011, two (2) new diesel generators have been brought into a project village Izh (with 108 kW operational MHP) in Chitral. It has been reported that the two new diesel generators have been purchased, one by a Bank and another by a Community Center to use them as back-up.

As per the monitoring requirements, it will thus not be necessary to monitor the kWh produced by back up diesel gensets used by the consumers which remain with the project boundary as far as the genset outputs don't flow through the meter as used to record the power output of the hydropower plant. Also, please note that no diesel generators are used to start-up the MHPs as the MHP plants use small ―self-exciting alternators. Thus, the emissions from the two gensets in Izh village are not actual project emissions. However, for conservativeness, the project participant deducts them from the emissions reductions.

The total backup usage of these two newly purchased diesel gen sets have been recorded, which is 13,014.69 kWh.
The project emissions are therefore calculated as: 3,014.69 kWh x 1.24 kg CO2 eq /kWh *1/1000 = 4 tCO2e

E.3. Calculation of leakage

As reported in 1st Verification Monitoring Report two (2) diesel generators are bought into the periphery/project boundry of MHP Izh by the community in violation of the "Terms of Partnership-ToP" signed with AKRSP. The kWh use of these diesel gensets have been recorded during the monitoring period.

During this reporting period (1st April 2011 to 31st March 2013) field engineers, plant operators and communities have not reported any evidence of sale of diesel generators by the communities to communities outside the project villages/ boundary. Therefore leakage will be considered as "0" (zero).

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (tCO_2eq)	Project emissions or actual net GHG removals by sinks (tCO_2eq)	Leakage ($t\ CO_2e$)	Emission reductions or net anthropogenic GHG removals by sinks (tCO_2eq)
Total	21,498	4	0	21,494

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions - (1 April 2011 – 31 December 2011)	36,634.5 (=48,846 x 9/12)	7,166
Emission reductions - (1 January 2012 – 31 December 2012)	101,835	11,354
Emission reductions - (1 January 2013 – 31 March 2013)	25,458.75 (=101,835 x 3/12)	2,974
Emission reductions or GHG removals by sinks (tCO_2eq)	163,928	21,494

E.6. Remarks on difference from estimated value in registered PDD

The project has under achieved the emission reduction as against the estimated values in the PDD, due to the following reasons;

- A GEF/UNDP funded USD 1.0 million was supposed to support productive uses and small businesses in the commissioned projects during 2009 and 2010. This project took longer time to initiate could not materialized in time, which has affected the volume of CERs.
- As per negotiations with PCRET and PPAF, funding support was expected to construct remaining 37 projects during 2011 and 2012. However, due to delayed approval processes, this funding support was not materialized during 2011 and 2012. The support is now expected during 2013 and remaining projects will be initiated as according to the availability of funds.

E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 01 January 2013 onwards
Emission reductions or GHG removals by sinks (tCO_2e)	24,627	2,974

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Document information

Version	*Date*	*Description*
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net anthropogenic GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.

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