INITIAL AND FIRST PERIODIC JI MONITORING REPORT

Implementation of energy-efficient lighting system in the Donetsk Region with the use of Kyoto Protocol mechanism: replacement of incandescent lamps with energy-efficient ones at budget financed and social entities in the Kramatorsk town (under Track 2)

INITIAL AND FIRST PERIODIC JI MONITORING REPORT
Monitoring Period
07/02/2011 – 31/08/2012

CONTENTS

SECTION A. General small-scale project activity and monitoring information

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

Implementation of energy-efficient lighting system in the Donetsk Region with the use of Kyoto Protocol mechanism: replacement of incandescent lamps with energy-efficient ones at budget financed and social entities in the Kramatorsk town (under Track 2)

Sectoral scope 3: Energy demand

Type: Small-scale

Version 01
14/09/2012

A.2. Short description of the small-scale project activity:

The project supports the replacement of 100 Wt and 150 Wt ICLs with 20 Wt and 32 Wt Compact Fluorescent Lamps (CFLs) which are energy saving lamps compared to ICLs, since they consume four-five times less power with similar lighting. CFLs are to be installed instead of the 100 W and 150 W ICLs and will provide the minimum light flux of 1,350 Lm and 2,180 Lm respectively. The service life of CFLs proposed for installation under the project reaches 8000 hours, which is 8 times higher than the service life of typical ICLs. CFLs are fully compatible with standard ICL holders (sockets) and provide "eye-safe" white soft lighting. The project covers the replacement of only the 100 Wt and 150 Wt ICLs with 20 Wt and 32 Wt CFLs.

A.3. Monitoring period:

07/02/2011 – 31/08/2012

A.4. Methodology applied to the project activity (incl. version number):

Monitoring plan of the GHG emissions in the project and baseline scenarios and the GHG emission reductions is elaborated on the basis of requirements of the "Guidance on criteria for baseline setting and monitoring", (version 02)[1].

The monitoring plan is based on project-specific JI approach and partly on methodology AMS II.J – "Demand-side activities for efficient lighting technologies" (version 04)[2] .

A.4.1. Baseline methodology:

The baseline chosen is provided in accordance with "Guidance on criteria for baseline setting and monitoring", (version 02)[3] and in accordance with "Guidelines for users of the joint implementation project PDD form for small-scale projects and the form for submission of bundled joint implementation small-scale projects " (version 04)[4].

---

[1] Source: http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf

[2] http://cdm.unfccc.int/methodologies/DB/5RMYBVTQ83H9CJA99M2392TSNO9IUJ

[3] Source: http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf

[4] http://ji.unfccc.int/Ref/Documents/Guidlines_users_JISC_PDD_Form.pdf

A.4.2. Monitoring methodology:

The chosen monitoring approach includes monitoring and estimation of baseline emissions, project scenario emissions and leakages. The GHG emissions are estimated as follows:

Stage1. Baseline emission calculation

Step1. The electricity consumption in baseline scenario in year 'y' is calculated as follows:

$$EC_{BL,y} = \sum_{i,j,k,l=1}^{n} Q_{BL,ijkl} \cdot P_{i,BL} \cdot OD_{ijkl} \cdot d_{ijkl} / 1000 \quad \text{(A.1)}$$

Table A.1. Description for baseline electricity consumption calculation

Symbol	Parameter Definition	Monitoring value
$EC_{BL,y}$	Baseline electricity consumption in year y (kWh)	Calculated based on Equation (A.1)
$\sum_{i,j,k,l=1}^{n}$	Sum over : - the group of "i" devices (i.e. 100 W and 150 W bulbs); - the type of day (workday or non-workday) - "j"; - the season (winter, spring, summer and autumn) - "k";	-
$Q_{BL,ijkl}$	Number (quantity) of devices of the group of "i" devices (i.e. 100 W and 150 W ICLs)	100 W: Schools: 7 448 Kindergartens: 6 196 Medicine: 5 044 Other: 3 373 150 W: Schools: 992 Kindergartens: 0 Medicine: 608 Other: 0
$P_{i,BL}$	Power of the devices of the group of "i" baseline devices	100 W and 150 W
OD_{ijkl}	Average daily operating hours of the devices of the group of **"i"** baseline devices (100 W and 150 W) during workdays (**j=1**) and non-workdays (**j=2**). The average daily operational hours were estimated for different **seasons (k)** (due to changes in illumination needs). Winter (k=1), Spring (k=2), Summer (k=3) and Autumn (k=4). February average daily hours were used for winter; April hours for Spring and July hours for Summer seasons. The average daily operational hours were also estimated for **type of buildings (l)** where the lamp is installed (School, Kindergarten or Medicine).	See section B.2.2.
d_{ijkl}	Number of days of monitoring period group of devices; for workdays (j=1) and non-workdays (j=2); during the season k; for the type of building l.	For Schools and Others: February 2011 – August 2012: 478 workdays, 94 non-workdays; For Kindergartens: February 2011 – August 2012: 399 workdays, 173 non-workdays. For Medicine: February 2011 – August 2012: 572 workdays

Step 2. The emission in baseline scenario in year 'y' is calculated as follows:

$$BE_y = EC_{BL,y} \cdot (1 - F_{CFL,y}) \cdot EF_{CO2,ELEC,y} \cdot 10^{-3} \quad \text{(A.2)}$$

Table A.2. Description for baseline emission calculation

Symbol	Parameter Definition	Monitoring value
BE_y	Emission in year, tCO_2	Calculated based on Equation (A.2)
$EC_{BL,y}$	Electricity consumption in year y, kWh	Calculated based on Equation (A.1)
$F_{CFL,y}$	Fraction of CFLs in local public buildings within budget funding, fraction	0[6]
$EF_{CO2,ELEC,y}$	Electricity consumption carbon emission factor for Ukraine, kg CO_2/kWh	1.227[7].

Stage2. Project emission calculation

Step1. The electricity consumption by the project activity in year 'y' is calculated as follows:

$$EC_{PJ,y} = \sum_{i,j,k,l=1}^{n} Q_{PJ,ijkl} \cdot P_{i,PJ} \cdot OD_{ijkl} \cdot d_{ijkl} / 1000 \quad \text{(A.3)}$$

Table A.3. Description for project electricity consumption calculation

Symbol	Parameter Definition	Monitoring value
$EC_{PJ,y}$	Project electricity consumption in year y (kWh)	Calculated based on Equation (A.3)
$\sum_{i,j,k,l=1}^{n}$	Sum over: - the group of "i" devices (i.e. 20 W and 32 W bulbs); - the type of day (workday or non-workday) - "j"; - the season (winter, spring, summer and autumn) - "k";	-
$Q_{PJ,ijkl}$	Number (quantity) of devices of the group of "i" devices (i.e. 20 W and 32 W bulbs)	100 W: Schools: 7 448 Kindergartens: 6 196 Medicine: 5 044 Other: 3 373 150 W: Schools: 992 Kindergartens: 0 Medicine: 608 Other: 0
$P_{i,PJ}$	Power of the devices of the group of "i" project devices	20 W or 32 W
OD_{ijkl}	Average daily operating hours of the devices of the group of **"i"** devices (20 W and 32 W) during workdays (**j=1**) and non-workdays (**j=2**).	See section B.2.2.

[6] The value of fraction of CFLs in public buildings within budget funding (F_{CFL}) was determined according to the letter # 774-01/13/4-12 dated 18 May 2012 obtained from State Agency on Energy Efficiency and Energy Saving of Ukraine, as an executive body responsible for the formation and implementation of unified state policy on energy saving (SD-8).

[7] http://www.neia.gov.ua/nature/doccatalog/document?id=127498

	The average daily operational hours were estimated for different **seasons (k)** (due to changes in illumination needs). Winter (k=1), Spring (k=2), Summer (k=3) and Autumn (k=4). February average daily hours were used for winter; April hours for Spring and July hours for Summer seasons. The average daily operational hours were also estimated for **type of buildings (l)** where the lamp is installed (School, Kindergarten, Medicine or Other).	
d_{ijkl}	Number of days of monitoring period for group of devices; for workdays (j=1) and non-workdays (j=2); during the season k; for the type of building (l).	For Schools and Others: February 2011 – August 2012: 478 workdays, 94 non-workdays; For Kindergartens: February 2011 – August 2012: 399 workdays, 173 non-workdays. For Medicine: February 2011 – August 2012: 572 workdays.

Step 2. The emission by the project activity in year 'y' is calculated as follows:

$$PE_y = EC_{PJ,y} \cdot EF_{CO2,ELEC,y} \cdot 10^{-3} \quad \text{(A.4)}$$

Table A.4. Description for project emission calculation

Symbol	Parameter Definition	Monitoring value
PE_y	Emission in year t CO_2	Calculated based on Equation (A.4)
$EC_{PJ,y}$	Electricity consumption in year y (kWh)	Calculated based on Equation (A.3)
$EF_{CO2,ELEC,y}$	Electricity consumption carbon emission factor for Ukraine, kg CO_2/kWh	1.227[8]

Stage 3. Leakages

There is no leakage in the project on either installation side or disposal side, due to the following reasons:

- Project leakage (indirect effects) may be incurred due to improper storage and partial re-use of ICLs that are replaced with CFLs. Leakage may occur, for example, either when undestroyed 100 W lamps are used instead of expired 60 W or 75 W ICLs in buildings outside of the project boundary or when such lamps are installed in locations with no illumination prior to project initiation. Implementing organizations properly replaced ICLs with CFLs, stored and disposed those ICLs being replaced.

- Replaced ICLs were collected from facilities and destroyed.

Possible other leakage:

[8] http://www.neia.gov.ua/nature/doccatalog/document?id=127498

- In the course of operation certain lamps fail which might result in decreased emission reductions. However, the project provides for the immediate replacement of failed CFLs with new CFLs. In the course of monitoring the replacement date is recording and the operating hours of the lamp are correcting as needed (e.g., during the replacement the time when the lamp is not functioning is subtracted from the daily number of operational hours).

- Unauthorized removal (theft) is possible for resale or personal use. But monitoring conditions for CFLs installed under the current project require a continuous supervision which effectively reduces the possibility of unauthorized removal. Also, the project stipulates immediate installation of new CFLs in case of detected unauthorized removal.

To ensure the immediate replacement of CFLs in case of their failure or unauthorized removal, a reserve of 1% working lamps is provided in each facility. According to the practice, this amount of reserve lamps is enough for immediate replacement/installation of working CFLs.

Stage 4. GHG emission reductions

GHG emission reductions in year 'y' (ER_y) are estimated by the following formula:

$$ER_y = (BE_y - PE_y) - LE_y \quad \text{(A.5)}$$

Where:
ER_y – Emission reductions in year y (tCO_2e)
BE_y – baseline GHG emissions in year 'y' (tCO_2e)
PE_y- project GHG emissions in year 'y' (tCO_2e)
LE_y – Leakage emissions in year y (tCO_2e)

A.5. Status of implementation including time table for major small-scale project parts:

As it was planned, the lamp replacement has started on 05 January 2011. The lamp replacement was finished at 04 February 2011. Therefore the project can be considered implemented.

Table A.5. Project Implementation

Activity	Actual date
Starting date of the lamp replacement	05/01/2011
Final date of the lamp replacement	04/02/2011
Start date of monitoring CFL use hours	07/02/2011

A.6. Intended deviations or revisions to the determined PDD and monitoring plan:

With aim to calculate complete GHG emissions under the project and baseline scenario, following corrections in monitoring plan are taken:
1) The formulas for calculating the electricity consumption in baseline scenario (1) and the electricity consumption by the small-scale project (3) were changed. Formulas that were used sum on the base of 'i' (the group of devices). Formulas that are used sum on the base of 'i' (the group of devices); the type of day 'j' (workday or non-workday); and season 'k' (winter, spring, summer, and Fall); and type of building 'l' (School, Kindergarten, Medicine, or Others).

A.7. Changes since last verification:

Not applicable.

A.8. Person(s) responsible for the preparation and submission of the monitoring report:

Name of the person/entity for the preparation and submission of the monitoring report:

Innovation Center "Ecosystem"
Address: 28 Symona Petlyury str., Kyiv, Ukraine
Tel: +38 044 498-08-87
Fax: +38 044 248-70-72
Contact person: Dmitriy Danilkin
Email: dmitriy.danilkin@ic-ecosystem.com

SECTION B. Key monitoring activities

B.1. Key monitoring activities according to the monitoring plan for the monitoring period stated in A.4.

First actual monitoring survey

The goal of the first monitoring survey is determining the following:

- Total number of CFLs installed in place of ICLs ($Q_{PJ,ijkl}$);
- power of replaced ICLs ($P_{i,BL}$);
- power of installed CFLs ($P_{i,PJ}$);
- number of operation hours of lighting instruments during a day (d_{ijkl});
- electricity consumption carbon emission factor for Ukraine ($EF_{CO2,ELEC,y}$).

The first actual monitoring effort took place in February 2011 (07/02/2011 – 28/02/2011). The effort included:

1. Monitoring of CFLs delivery and distribution;
2. Monitoring of CFLs installation;
3. Monitoring of ICLs disposal;
4. Monitoring of daily CFLs usage hours;
5. Monitoring of workdays and non-workdays days;
6. Monitoring of replacement of failed CFLs with new CFLs.

These activities are described below if detail:

1. CFLs were transferred from Carbon Futures to "Ecosystem" in January, 2011 (please see Transfer and Acceptance Act in supporting documents (SD-4)). Then CFLs were transferred from "Ecosystem" to City Council for distribution (please see Transfer and Acceptance Act in supporting documents (SD-2)).
2. CFLs were installed by City Council (please see REPORT OF ACCEPTANCE OF WORK ON REPLACEMENT in supporting documents (SD-3));
3. ICLs that were replaced were utilized for avoiding leakages (please see REPORT OF INCANDESCENT LAMP UTILIZATION in supporting documents (SD-5)).
4. The number of operation hours of lamps was fixed in the operation hours' log in each facility of the small-scale project. Then aggregated data was obtained from the facilities by Special Working Group of the Town and transmitted to "Ecosystem".

Periodic monitoring surveys

The goal of periodic monitoring survey is monitoring of the amount of operation hours of installed CFLs during a day; fraction of CFLs in local public buildings within budget funding; electricity consumption carbon emission factor for Ukraine.

The periodic monitoring took place in February (07/02/2011 – 28/02/2011), April (01/04/2011 – 30/04/2011), July (01/07/2011- 31/07/2011), October (01/10/2011 – 31/10/2011), February (01/02/2012 – 29/02/2012), April (01/04/2012 – 30/04/2012), July (01/07/2012 – 31/07/2012).

The table below shows the monitoring plan of the operation hour's number of lighting instruments during a day.

Table B.1. OD_{ijkl} parameter survey plan

#	Attribute	Project plan
1	Goal	The goal is estimating the average number of CFL operation hours during the season (winter, spring, summer and autumn); during workdays and non-workdays; and for type of buildings where the lamp is installed.
2	Goal of operational measuring and data to be collected	The operation hours' logs are used for daily record of operation hours of lighting instruments in all facilities within 16 weeks per year for the full year (4 weeks in January, April, July and October). This data are used for calculation of average weighed value of daily operation hours. The average weighed values are effective within the whole crediting period.
3	Data collection period	Because of different duration of the light day, monitoring is conducted for 16 months per full year (4 weeks in January, April, July and October). The data received for four weeks during each season are used to calculate the average daily usage of CFLs for workdays and non-workdays during this season (OD_{ijkl}). This average value is used for calculating the total work-hours during the entire season. Since the CFL usage started on February 7 the total work hours for month of February were calculated based on daily monitoring for the period of February 7-28th, 2011.
4	Data collection method	Within the monitoring period, data is collected in the operation hours' logs by entering the start-stop timing and then calculating lamp operation hours during each monitoring day.

B.2. Data collection (accumulated data for the whole monitoring period):

Monitoring data (original logs, relevant acts and other documents) is collected in paper format and are kept for at least 2 years after the end of the crediting period. Aggregated information in Microsoft Excel format is saved on a hard drive and will be kept for at least 2 years by a representative of "Ecosystem" after the crediting period. To ensure reliability of information storage in the electronic format, files are backed up and saved on DVD and will be kept in the office of "Ecosystem" for at least 2 years after the crediting period.

B.2.1. List of fixed default values and ex-ante baseline factors:

Table B.2. Fixed default values

Variable	Source	Units	Value
Number (quantity) of devices of the group of "i" devices (i.e. 20 W and 32 W CFLs) $Q_{ijkl,PJ}$	Transfer and Acceptance Act (SD-3) and LogBooks	pieces	20 W: Schools: 7 448 Kindergartens: 6 196 Medicine: 5 044 Other: 3 373

			32 W: Schools: 992 Kindergartens: 0 Medicine: 608 Other: 0
Power of the devices of the group of "i" baseline devices $P_{i,BL}$	Transfer and Acceptance Act (SD-3)	Watts	100 150
Power of the devices of the group of "i" project devices $P_{i,PJ}$	Transfer and Acceptance Act (SD-3)	Watts	20 32

B.2.2. List of variables:

Table B.3. Variables

Variable	Source	Units	Value
Specific indirect carbon dioxide emissions from electric power consumption EF_{CO2}	Orders of National Environmental Investment Agency	$kgCO_2/kWh$	1.227[10]
Average daily operating hours of the devices of the group of "i" baseline devices during workdays (j=1) and non-workday j=2); The average daily operational hours were estimated for different seasons (k) (due to changes in illumination needs). Winter (k=1), Spring (k=2), Summer (k=3) and Autumn (k=4). February average daily hours were used for winter; April hours for Spring and July hours for Summer seasons. The average daily operational hours were also estimated for type of buildings (l) where the lamp is installed (School, Kindergarten or Medicine). OD_{ijkl}	LogBooks	hours	See table B.4.
Fraction of CFLs in public buildings within budget funding ($F_{CFL,y}$)	According to the information obtained from state bodies responsible for the formation and implementation of unified state policy on energy saving and/or from state statistics	Fraction	0[11]

[10] http://www.neia.gov.ua/nature/doccatalog/document?id=127498

[11] The value of fraction of CFLs in public buildings within budget funding (F_{CFL}) was determined according to the letter # 774-01/13/4-12 dated 18 May 2012 obtained from State Agency on Energy Efficiency and Energy Saving of Ukraine, as an executive body responsible for the formation and implementation of unified state policy on energy saving (SD-8).

Table B.4. Average daily operating hours

Item / Period	Schools		Kindergartens		Medicine		Other	
	20 W	32 W	20 W	32 W	20 W	32 W	20 W	32 W
February 2011	8.69	8.83	9.04	0.00	12.85	12.84	9.96	0.00
	1.89	0.00	1.39	0.00	0.00	0.00	1.10	0.00
March-May 2011	7.49	7.53	7.69	0.00	11.94	11.71	8.51	0.00
	1.60	0.00	1.19	0.00	0.00	0.00	0.96	0.00
June-August 2011	4.39	4.44	4.80	0.00	12.17	12.17	4.46	0.00
	4.08	4.09	1.33	0.00	0.00	0.00	0.96	0.00
September-November 2011	7.68	7.66	8.62	0.00	14.76	14.34	8.54	0.00
	1.64	0.00	1.52	0.00	0.00	0.00	1.93	0.00
December 2011-February 2012	8.26	8.52	8.96	0.00	13.44	13.19	8.12	0.00
	1.64	0.00	1.11	0.00	0.00	0.00	1.33	0.00
March-May 2012	7.57	7.85	7.80	0.00	12.30	11.80	7.45	0.00
	1.64	0.00	1.14	0.00	0.00	0.00	1.26	0.00
June-August 2012	3.84	3.62	3.80	0.00	3.84	0.00	10.69	11.16
	1.64	0.00	1.07	0.00	1.38	0.00	0.00	0.00

B.2.3. Data concerning environmental impacts:

The environmental impacts derived through the project activity are such positive ones as energy savings.

B.3. Special event log:

No special events.

SECTION C. Quality assurance and quality control measures

C.1. Documented procedures and management plan:

C.1.1. Roles and responsibilities:

Frequency of reporting for monitoring period (07/02/2011 – 31/08/2012) was the following. Facility Managers recorded operational hours and number of lamps each day. Special Working Group and Project Coordinator aggregated data obtained from the each facility in February, April, July and October in 2011 and in February, April and July in 2012 and calculated emission reductions for whole monitoring period.

C.1.2. Trainings:

Staff involved in the project implementation and checks was trained according to the guidelines. The training facts are fixed in the training protocols (see minutes of the meeting on Philips energy efficient lamp monitoring in educational and healthcare facilities (SD-10)).

C.2. Internal audits and control measures:

Project monitoring includes all procedures required for supplies, installation, operation, and continuous replacement of Philips energy efficiency lamps. “Ecosystem” is responsible for data collection and reporting. Municipal authorities have created a Special Working Group (SWG) to provide permanent project implementation supervision in the form of internal checks.

At each facility a responsible person or manager carries out a specific task of the project implementation monitoring and required protection. Internal checks of sites are performed by SWGs to ensure the proper project implementation.

C.3. Troubleshooting procedures:

During the monitor period there were no special events. Therefore, there are no deviations from monitoring plan of GHG emission reduction.

SECTION D. Calculation of GHG emission reductions

D.1. GHG emissions reduction:

D.1.1. Project emissions:

Results for Emission Reduction for Monitoring Period are shown below. The calculation is provided in supporting documentation.

Table D.1. Result for project emissions

Period	Project Emissions, tCO_2
February, 2011	119
March-May, 2011	426
June-August, 2011	336
September-November,2011	483
December 2011-February 2012	470
March-May, 2012	425
June-August, 2012	283
Total	2 542

D.1.2. Baseline emissions:

Results for Emission Reduction for Monitoring Period are shown below. The calculation is provided in supporting documentation.

Table D.2. Result for baseline emissions calculation

Period	Baseline Emission, tCO_2
February, 2011	589
March-May, 2011	2 117
June-August, 2011	1 667
September-November,2011	2 396
December 2011-February 2012	2 334
March-May, 2012	2 108
June-August, 2012	1 405
Total	12 616

D.1.3. Leakage:

No Leakages.

D.1.4. Summary of the emissions reductions during the monitoring period:

Results for Emission Reductions for Monitoring Period are shown below. The calculation is provided in supporting documentation.

Table D.3. Emission reductions

Period	Project emissions (tonnes of CO_2 equivalent)	Leakage (tonnes of CO_2 equivalent)	Baseline emissions (tonnes of CO_2 equivalent)	Emission reductions (tonnes of CO_2 equivalent)
February, 2011	119	0	589	470
March-May, 2011	426	0	2 117	1 691
June-August, 2011	336	0	1 667	1 331
September-November,2011	483	0	2 396	1 913
December 2011-February 2012	470	0	2 334	1 864
March-May, 2012	425	0	2 108	1 683
June-August, 2012	283	0	1 405	1 122
Total (tonnes of CO_2 equivalent)	2 542	0	12 616	10 074