

**MONITORING REPORT FORM (CDM-MR) \***  
**Version 01 - in effect as of: 28/09/2010**

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\* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

**MONITORING REPORT**  
**Version 1.0 18/01/2012**

**Southern District Heating Network in Urumqi City**  
**UNFCCC reference number: 4295**  
**The first monitoring period (15/10/2011 - 31/12/2011, first and last days included)**

**SECTION A. General description of the project activity**

**A.1. Brief description of the project activity: >>**

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Southern District Heating Network project (referred to as the project activity hereafter) is located in Urumqi City, Capital of Xinjiang Uygur Autonomous Region. The project activity was constructed and implemented by Urumqi Heating Supply Co., Ltd (referred to as the project owner hereafter). The purpose of the project activity is to supply space heat for 17,490,000 m<sup>2</sup> of buildings. The total heating supply capacity is 1,445 MW. The measures taken by the project activity to reduce greenhouse gas emissions is the introduction of a new primary district heating system to replace the existing isolated small heating systems, improving the thermal energy efficiency for space heating in the target area.

The project activity introduces a new primary district heating system, using heat extracted from the existing Xinjiang Huadian Hongyanchi Power Plant, three existing and one new heat-only boilers (HOB).

**Project timeline**

Date of CDM registration	20/06/2011
Crediting period	Fixed crediting period
Starting date of crediting period	15/10/2011
End date of crediting period	14/10/2021
Construction start date	04/04/2005
Commissioning start date	15/10/2005

This monitoring period starts from 15/10/2011 and is ended on 31/12/2011, first and last days inclusive.

The total emission reductions achieved in this monitoring period are 301,614tCO<sub>2</sub>e.

**A.2. Project Participants**

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<b>Name of Party involved</b>	<b>Private and/or public entity(ies) project participants (as applicable)</b>	<b>Party involved wishes to be considered as project participant (Yes/No)</b>
P.R. China (host)	Urumqi Heating Supply Co., Ltd.	No
United Kingdom of Great Britain and Northern Ireland	Carbon Resource Management Ltd.	No

**A.3. Location of the project activity:**

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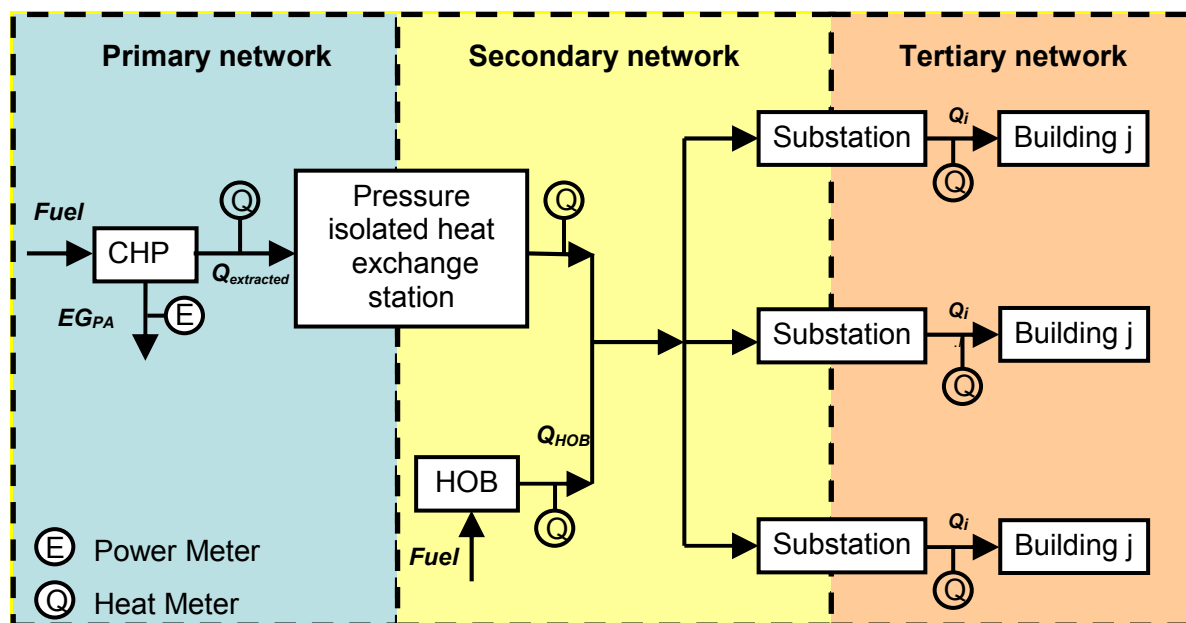
Host country	People's Republic of China
Province	Xinjiang
City	Urumqi
GPS coordinates	Latitude 43°43'56" to 43°49'31" North Longitude 87°36'20" to 87°39'25" East
Area description	North of Hongshan Road, west of Hetan Road, East of Eastern Cross-border

#### A.4. Technical description of the project

&gt;&gt;

The technology employed in the scenario of project activity is a new primary district heating system to replace the existing isolated small heating systems. The main heat sources are delivered from the CHP plant with grid connected 4×200MW extraction condensing power units for cogeneration plus four heat-only boilers (HOB) as supplementary heat sources. The total heating supply capacity of the primary district heating network is 1,445 MW, in which 754MW is from the CHP plant and 691MW is from the four heat only boilers, 142 small inefficient boiler houses were replaced by the project. It is estimated that when the project completed, the total area of 17,490,000 m<sup>2</sup> need 13,139,983 GJ heat annually, including 9,387,948 GJ from CHP plant, 3,752,035 GJ from the HOBs. The main emission sources involved in the project activity are sourced from coal consumption for generation of heat and electricity by CHP plant and coal consumption in heat only boilers that supply heat to the district heating system, and the main greenhouse gas emitted by the project activities is CO<sub>2</sub>.

Figure below illustrates the structure of the primary heating network and the heating energy flows as well as the measurement points for heating supply from the CHP plant and heat only boilers to buildings ( $Q_{B_j, iB}$ ).



#### A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

&gt;&gt;

Methodology:

AM0058 "Introduction of a new primary district heating system", version 03.1

Tools:

"Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion", version 02.

#### A.6. Registration date of the project activity:

&gt;&gt;

20/06/2011 (PDD version 6, dated 15/06/2011)

#### A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

&gt;&gt;

Crediting period	Fixed 10-year crediting period
Starting date of crediting period	15/10/2011
End date of crediting period	14/10/2021

#### **A.8. Name of responsible person(s)/entity(ies):**

>> Contact information of the person(s)/entity(ies) responsible for completing the monitoring report form (CDM-MR):

- The persons preparing the documentation were:
  - Mr. Zhu Hailei, [zhl@carbonresource.com](mailto:zhl@carbonresource.com), Tel: +86 10 8447 5246/8
  - Dr. John Green, [jg@carbonresource.com](mailto:jg@carbonresource.com), Tel: +41 22 328 08 51

### **SECTION B. Implementation of the project activity**

#### **B.1. Implementation status of the project activity**

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The project activity started commissioning on 15/10/2005.

The actual operation of the project activity during this monitoring period was normal.

No events or situations occurred during the monitoring period, which may impact the applicability of the methodology.

#### **B.2. Revision of the monitoring plan**

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The monitoring plan is implemented as in the registered CDM-PDD, no revision is applied.

#### **B.3. Request for deviation applied to this monitoring period**

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The monitoring plan is implemented as in the registered CDM-PDD, no deviation is applied.

#### **B.4. Notification or request of approval of changes**

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The project activity is implemented as in the registered CDM-PDD, there is no notification or request of approval of changes from the project activity as described in the registered CDM-PDD.

### **SECTION C. Description of the monitoring system**

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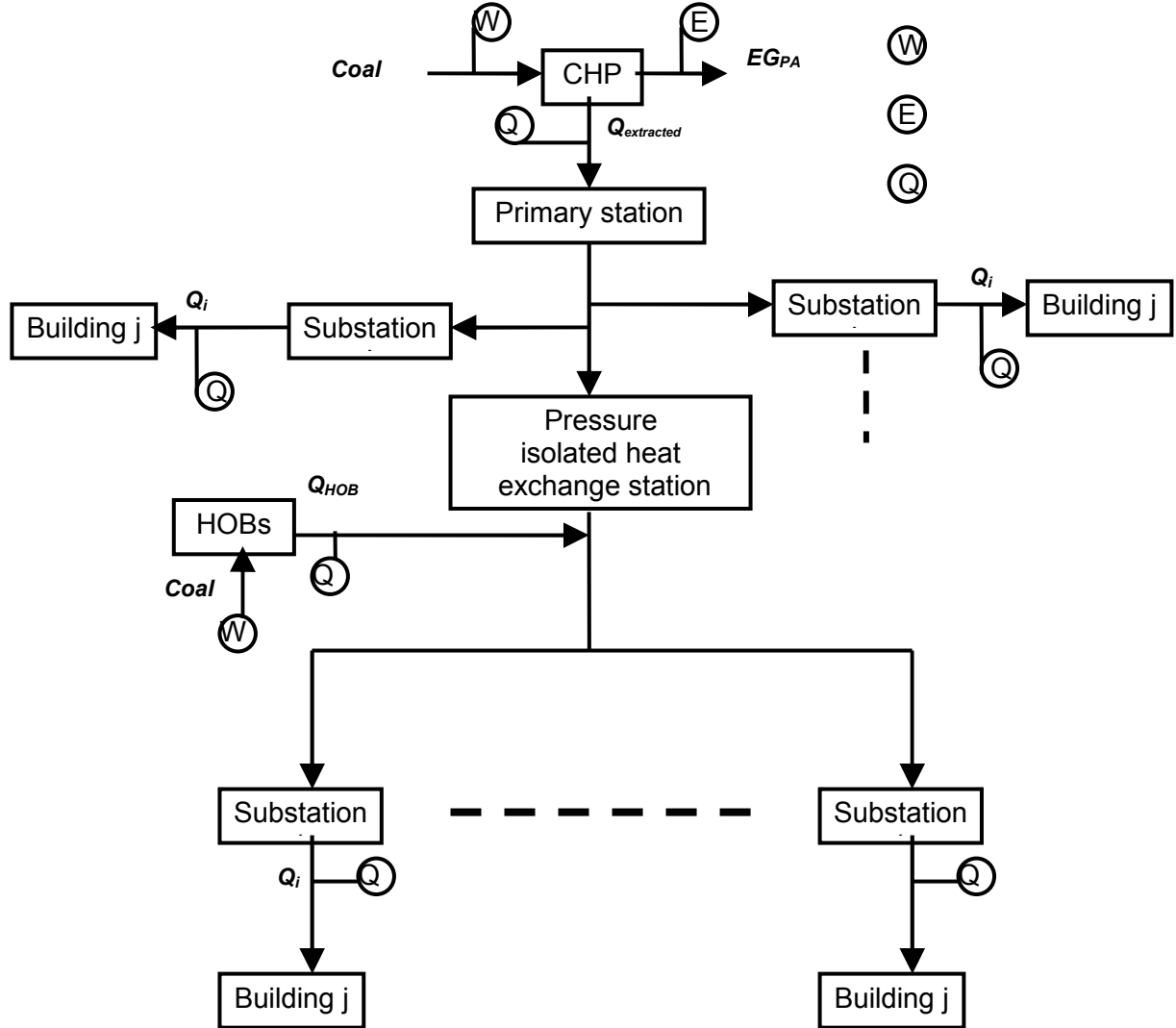
#### **1. Data collection procedure**

The following data and parameters are monitored:

- i) Coal consumption of the CHP boilers  $FC_{PA,CHP,y}$  and those by the four HOB boilers  $FC_{PA,HOB,y}$ . The data are monitored continuously and reported monthly at 24:00 of the last day of the month.  $FC_{PA,CHP,y}$  and  $FC_{PA,HOB,y}$  are monitored through the use of on site strap balance.
- ii) Quantity of heat supply during the project implementation, including the quantity of heat extracted from CHP plant  $Q_{extracted}$ , the quantity of heat delivered from the HOB boilers  $Q_{HOB,y}$  and the quantity of heat supplied by substation  $i$   $Q_{i,y}$ ; The heat is monitored continuously by the on site heat meters and reported monthly at 24:00 of the last day of the month by trained staff of Project owner.
- iii) Quantity of electricity delivered to the grid during the project implementation from CHP  $EG_{PA}$ . In case the CHP plant import electricity from the grid, if any, the  $EG_{PA}$  is calculated as net electricity delivered to the grid by subtracting electricity imported. The electricity is monitored continuously by the power meters installed at the on site substation. The report and invoices are issued monthly by the trained staff of CHP at 24:00 of the last day of the month.

- iv)  $NCV_{i,y}$ , weighted average net calorific value of fuel coal combusted in the CHP plant and the HOB boilers in year  $y$ . The value is provided PP.
- v)  $A_{j,i}$ , total carpet area of all the building in category  $j$  supplied by substation  $i$ , obtaining from estimations available from actual measurement or local authorities referred to the table1 and table3 of Annex3 in the registered PDD.

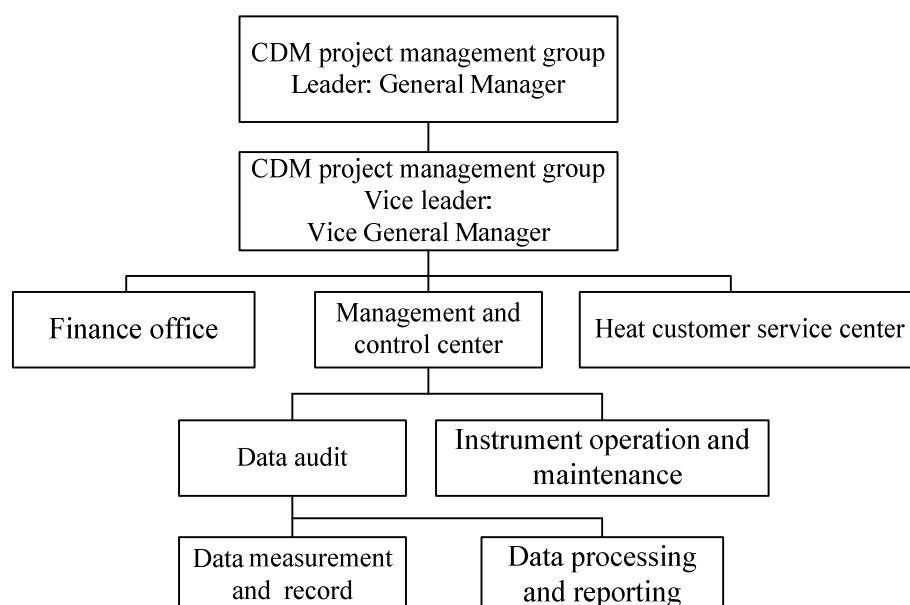
The detailed layout of the installation of the monitoring instruments is as the following figure.



(E) power meter (Q) heat meter (W) strap balance

## 2. Organizational structure, Roles and responsibilities of personnel

Urumqi Heating Supply Co., Ltd. is the project entity, operator, and is also responsible for the monitoring plan and its implementation. A dedicated CDM project management group has been established by the Urumqi Heating Supply Co., Ltd. The institutional structure and function of the group is shown in following figure.



### 3. QA / QC and emergency procedure

#### Quality assurance and quality control

The original monitoring data and results of data processing are subject to internal auditing by the staff in the responsible data audit unit. During the QA/QC process those monitoring data are crosschecked with the energy invoices to ensure that the monitored records are accurate and reliable.

#### Emergency procedure

The management and control centre responsible for monitoring the operation of southern district heating network is located in the main control center (MCC), where two set of data server are installed, one is main server and another is submissive server. When the main server is out of work, the submissive one is switched to replace the main server.

For the electricity monitoring, when the main electricity meter is found to be in malfunction, the backup electricity meter will take place of it.

For the heat supply monitoring, when the heat relevant parameters exceeds the safety limitation, the monitoring system will alarm with sound and light signals. And the emergency response procedure will start immediately and automatically.

All data collected as part of monitoring should be archived and be kept at least for 2 years after the end of the crediting period.

## SECTION D. Data and parameters

### D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

<b>Data / Parameter:</b>	<b>EF<sub>grid,CM,y</sub></b>
<b>Data unit:</b>	<b>tCO<sub>2</sub>/MWh</b>
<b>Description:</b>	Emission factor of the electricity grid system
<b>Source of data used:</b>	PDD
<b>Value(s) :</b>	0.8712
<b>Indicate what the data are used for (Baseline/ Project/</b>	Leakage emission calculation

Leakage emission calculations)	
Additional comment:	N/A

<b>Data / Parameter:</b>	$EF_{BL,EL}$
Data unit:	tCO <sub>2</sub> /MWh
Description:	Baseline emission factor for the electricity production
Source of data used:	Registered PDD
Value(s) :	0.9363
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Additional comment:	N/A

<b>Data / Parameter:</b>	$CAP_{j,i}$
Data unit:	GJ/year
Description:	Nameplate capacity of existing boilers in category j at substation i
Source of data used:	project FSR
Value(s) :	Shown in Table 1 of Annex 3 in the registered PDD
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Additional comment:	N/A

<b>Data / Parameter:</b>	$EG_{max,hist}$
Data unit:	MWh
Description:	Maximum historic annual amount of electricity generated by the power plant used over the three most recent years prior to the start of implementation of the project activity
Source of data used:	Historic data of last 3 years (10/2002-09/2005) from the CHP plant
Value(s) :	4,526,364MWh
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Additional comment:	N/A

<b>Data / Parameter:</b>	$EG_{min,hist}$
Data unit:	MWh
Description:	Minimum historic annual amount of electricity generated by the power plant used over the three most recent years prior to the start of implementation of the project activity
Source of data used:	Historic data of last 3 years (10/2002-09/2005) from the CHP plant
Value(s) :	1,916,680
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Leakage calculation
Additional comment:	N/A

<b>Data / Parameter:</b>	$COEF_{BL,HG,j,i}$
Data unit:	tCO <sub>2</sub> /GJ
Description:	CO2 emission factor of the fuel coal used in the absence of the project

	activity in the heat generation system corresponding to substation $i$
Source of data used:	IPCC default values as provided in table 1.4 of Chapter 1 of vol. 2 (Energy) of 2006 IPCC Guidelines on National GHG Inventories.
Value(s) :	Coal: 0.0997
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Additional comment:	Using IPCC default values at the upper limit of the uncertainty at the 95% confidence interval in accordance with the methodology.

<b>Data / Parameter:</b>	$\varepsilon_{BL,HG,j,i}$
Data unit:	%
Data unit:	Efficiency of the heating supply system that would have been used in the absence of the project activity for category $j$ and substation $i$
Description:	Based on historic survey data for 142 small boiler houses and No.140 large heat only boiler house, existing boiler house information are available on FSR Attachment, including historical annual coal consumption, space heating building area, etc. . For the No.144 and No. 145, their actual coal consumption and actual heat supplied were provided by Urumqi Heating Supply Co., Ltd.
Source of data used:	registered PDD
Value(s) :	Shown in Table 3 of Annex 3 of the registered PDD
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Additional comment:	/

<b>Data / Parameter:</b>	$\frac{44}{12} * \frac{EF_{FF,BL,EL}}{NCV_{FF,BL,EL}}$
Data unit:	t CO <sub>2</sub> /GJ
Description:	CO <sub>2</sub> emission factor of coal fired in the power plant used prior to the start of the implementation of the project activity
Source of data used:	default value at the upper limit of the uncertainty at a 95% confidence interval of 2006 IPCC Guidelines on National GHG Inventories
Value(s) :	0.0997
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Additional comment:	/

<b>Data / Parameter:</b>	$j$
Data unit:	/
Description:	Categories grouped by (i) type of buildings (new/existing), (ii) type of technology used and (iii) fuel type used in the absence of the project activity. For each category $j$ , all connected buildings should be clearly identified.
Source of data used:	Urumqi Heating Supply Co., Ltd. show map
Value(s) :	3
Indicate what the data are used for (Baseline/ Project/ Leakage emission)	N/A



calculations)	
Additional comment:	N/A

## D.2. Data and parameters monitored

<b>Data / Parameter:</b>	$EG_{PA,y}$
Data unit:	MWh
Description:	Actual quantity of electricity supplied to the grid in the year y
Measured /Calculated /Default:	Measured
Source of data:	Electricity meter at the CHP plant.
Value(s) of monitored parameter:	880,624.044
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	/
Measuring/ Reading/ Recording frequency:	Measuring continuously/Recording monthly
Calculation method (if applicable):	/
QA/QC procedures applied:	Cross check with the receipts of sales

<b>Data / Parameter:</b>	Status of the district heating system and capacity
Data unit:	Number of substations
Description:	Dates of commissioning and status of rated capacity of boilers
Measured /Calculated /Default:	Measured
Source of data:	Schematic-plan diagrams of the southern district heating system obtained at Urumqi Heating Supply Co., Ltd. and the map of the southern district heating system planning provided in FSR based on the urban construction plan by the responsible Urumqi Urban Planning Bureau
Value(s) of monitored parameter:	174
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emission calculation

Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	/
Measuring/ Reading/ Recording frequency:	/
Calculation method (if applicable):	N/A
QA/QC procedures applied:	/

<b>Data / Parameter:</b>	$Q_{\text{extracted},y}$
Data unit:	GJ
Description:	Quantity of heat extracted from the CHP Plant during the year $y$
Measured /Calculated /Default:	Measured
Source of data:	Heat meter at supply side of primary heat exchanger
Value(s) of monitored parameter:	3,921,602
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	/
Measuring/ Reading/ Recording frequency:	Hourly Measuring/Monthly Recording
Calculation method (if applicable):	N/A
QA/QC procedures applied:	/

<b>Data / Parameter:</b>	$Q_{HOB,y}$
Data unit:	GJ
Description:	Quantity of heat extracted from all heat only boiler houses during the year $y$
Measured /Calculated /Default:	Measured
Source of data:	Heat meter at supply side of each boiler houses
Value(s) of monitored parameter:	0

Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	/
Measuring/ Reading/ Recording frequency:	Hourly Measuring/Monthly Recording
Calculation method (if applicable):	N/A
QA/QC procedures applied:	/

<b>Data / Parameter:</b>	$A_{j,i}$
Data unit:	$m^2$
Description:	Total carpet area of all the building in category j supplied by substation $i$
Measured /Calculated /Default:	Measured
Source of data:	Estimations available from approved FSR for existing buildings and new buildings within the Urumqi Southern District Heating Network, which are originally from Urumqi Heating Supply Co., Ltd. and confirmed by Urumqi Urban Planning Bureau
Value(s) of monitored parameter:	See the details in the calculating spreadsheet
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	/
Measuring/ Reading/ Recording frequency:	/
Calculation method (if applicable):	N/A
QA/QC procedures applied:	/

<b>Data / Parameter:</b>	$Q_{i,y}$
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Data unit:	GJ
Description:	Quantity of heat supplied from substation $i$ to category $j$ buildings
Measured /Calculated /Default:	Measured
Source of data:	On site measurements of heat meters at substations
Value(s) of monitored parameter:	See the details in section E1
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	See the details of Annex
Measuring/ Reading/ Recording frequency:	Hourly Measuring/Monthly Recording
Calculation method (if applicable):	N/A
QA/QC procedures applied:	/

<b>Data / Parameter:</b>	<b><math>FC_{i,j,y}</math></b>
Data unit:	ton/yr
Description:	Quantity of fuel coal combusted in process $j$ during the year $y$
Measured /Calculated /Default:	Measured
Source of data:	Onsite measurements of the quantity of coal consumed for the boiler houses in the CHP plant and the four HOB boiler houses
Value(s) of monitored parameter:	See the details in section E2
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Strap balance
Measuring/ Reading/ Recording frequency:	Continuously Measuring/Monthly Recording
Calculation method (if applicable):	N/A

applicable):	
QA/QC procedures applied:	/

<b>Data / Parameter:</b>	<b><math>NCV_{i,y}</math>, <math>i=coal</math></b>
Data unit:	GJ/ton
Description:	Weighted average net calorific value of fuel coal consumed in CHP and HOB Boiler House in year $y$
Measured /Calculated /Default:	Measured
Source of data:	The value sourced from the record of PP
Value(s) of monitored parameter:	See the details in section E2
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	/
Measuring/ Reading/ Recording frequency:	The $NCV_{i,y}$ is measured for each fuel delivery, from which weighted average annual values could be calculated
Calculation method (if applicable):	N/A
QA/QC procedures applied:	/

<b>Data / Parameter:</b>	<b><math>EF_{CO_2,i,y}</math>, <math>i=coal</math></b>
Data unit:	tCO <sub>2</sub> /GJ
Description:	Weighted average CO <sub>2</sub> emission factor of fuel type in year $y$
Measured /Calculated /Default:	Default
Source of data:	IPCC 2006 default value at the upper limit of the uncertainty at a 95% confidence interval of 2006 IPCC Guidelines on National GHG Inventories
Value(s) of monitored parameter:	0.0997
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission calculation

Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	/
Measuring/ Reading/ Recording frequency:	/
Calculation method (if applicable):	N/A
QA/QC procedures applied:	/

<b>Data / Parameter:</b>	$\eta_{BL, EL}$
Data unit:	%
Description:	Efficiency of the power plant used prior to the start of the implementation of the project activity
Measured /Calculated /Default:	Measured
Source of data:	CHP plant
Value(s) of monitored parameter:	38.31
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	/
Measuring/ Reading/ Recording frequency:	/
Calculation method (if applicable):	N/A
QA/QC procedures applied:	/

## SECTION E. Emission reductions calculation

### E.1. Baseline emissions calculation

>>

The baseline emissions in year  $y$  is calculated as

$$BE_y = BE_{HG,y} + BE_{EL,y}$$

Where:

$BE_y$ . Baseline emission during the year  $y$ , (tCO<sub>2</sub>e);

$BE_{HG,y}$  Baseline emissions from the generation of heat during the year  $y$  (tCO<sub>2</sub>e);  
 $BE_{EL,y}$  Baseline emissions from the generation of electricity during the year  $y$  (tCO<sub>2</sub>e).

For the estimation of baseline emissions from the generation of heat the following stepwise approach is applied.

### Step 1: Baseline emissions from heat generation

Baseline emissions from heat generation are calculated as follows:

$$BE_{HG,y} = \sum_i \sum_{j \in 1} Q_{j,i,y} \times EF_{BL,HG,j,i} + \sum_i \sum_{j \in 2} Q_{j,i,y} \times EF_{BL,HG,j,i} + \sum_i \sum_{j \in 3} Q_{j,i,y} \times EF_{BL,HG,j,i}$$

Where:

$BE_{HG,y}$  Baseline emissions from the generation of heat during the year  $y$  (tCO<sub>2</sub>e);  
 $Q_{j,i,y}$  Quantity of heat supplied from substation  $i$  to buildings in category  $j$  in the year  $y$  monitored by the on site heat meters(GJ);  
 $EF_{BLHG,j,i}$  CO<sub>2</sub> emission factor for heat generation for building category  $j$  connected to substation  $i$  in the absence of the project activity (tCO<sub>2</sub>/GJ);  
 $j$  3 categories included in the project boundary defined as combination of building type  
 Buildings of category 1: Buildings in a part of the area supplied by a sub-station that were connected to an existing isolated heat distribution network before the start of the project activity, treated as exist buildings.  
 Buildings of category 2: Recently constructed buildings that are connected to sub-stations that replace old boiler houses, treated as exist buildings  
 Buildings of category 3: Buildings in a part of the area supplied by a sub-station in an area which prior to project activity did not have any heat distribution network, treated as new buildings.  
 $i$  All substations included in the project boundary, the detailed information could be found in the calculation spreadsheet.

For the cases where the category  $j$  consists of existing buildings, as per the definition provided earlier in the procedure for the identification of the baseline scenario, the quantity of heat supplied to this category from substation  $i$  should be estimated as follows:

$$Q_{i,y} = \min \{Q_{inst\_cap,j,i}, Q_{i,y}\}$$

Where:

$Q_{inst\_cap,j,i}$  Maximum quantity of heat that could have been supplied per year by existing boiler(s) supplying to category  $j$  building within the area supplied by substation  $i$  in the absence of the project activity, (GJ), where ' $j$ ' belongs to set of all categories of 'existing buildings' within the substation  $i$ .

The maximum quantity of heat  $Q_{inst\_cap,j,i}$  is determined by multiplying a nameplate capacity value  $CAP_{j,i}$  of the boiler supplying to building type  $j$  at substation  $i$  with  $T$ , the number of operational hours per year, during this monitoring period,  $T=78 \text{ days} \times 24 \text{ hours/day}=1872 \text{ hours}$ .

$$Q_{inst\_cap,j,i} = CAP_{j,i} \times T$$

The baseline emissions from heat generation are summarised as follows, with a detailed list of each building and substation provided in the spreadsheet:

Substation	$i$	$j$	Weighted average $\epsilon_{BL-HG,i,i}$	$Q_{i,i,v}$ * GJ	Weighted average $EF_{BL,HG,i,i}$ tCO <sub>2</sub> /GJ	$BE_{HG,i,v}$ tCO <sub>2</sub>
Existing buildings						458,524
New buildings			85%		0.11729	49,797
Aggregate						508,321

Note: \*  $Q_{i,y}$  capped for existing building as indicated above.

The total baseline emissions from the heat generation are 508,321tCO<sub>2</sub>.

## Step 2 Baseline emissions from the power generation

Baseline emissions from the power generation are calculated as follows:

$$BE_{EL,y} = \min\{EG_{max, hist} ; EG_{PA, y}\} \times EF_{BL, EL}$$

Where:

$BE_{EL,y}$  is the Baseline emissions from the generation of electricity during the year y, (tCO<sub>2</sub>e);

$EF_{BL, EL}$  is the Baseline emission factor for the electricity production, (tCO<sub>2</sub>/MWh);

$EG_{PA, y}$  is the Monitored actual quantity of electricity supplied to the grid in the year y (MWh);

$EG_{max, hist}$  is the Maximum historic annual amount of electricity production over the three most recent years prior to the start of the implementation of the project activity, (MWh).

Period	EG <sub>PA,y</sub> (MWh)
15/10/2011 to 31/10/2011	177,131.840
01/11/2011 to 30/11/2011	365,847.004
01/12/2011 to 31/12/2011	337,645.200
15/10/2011 to 31/12/2011	880,624.044

The length of this monitoring period is 78days, so during this monitoring period,  $EG_{max, hist}$  should be 78/365 of the yearly  $EG_{max, hist,y}$ ,  $EG_{max, hist} = 78/365 \times 4,526,364 = 967,277.786$  MWh. Thus the monitored actual quantity of electricity supplied is taken.

$EF_{BL, EL}$  is determined ex-ante in the PDD as 0.9369 tCO<sub>2</sub>/MWh.

During this monitoring period, the Baseline emissions from the power generation are therefore calculated as  $BE_{EL,y} = EG_{PA, y} \times EF_{BL, EL} = 880,624.044 \times 0.9369 = 825,041$  tCO<sub>2</sub>.

As the calculation above, the baseline emission ( $BE_y$ ) equals to the sum of the baseline emission from electricity supply ( $BE_{EL,y}$ ) and the baseline emission from heat supply ( $BE_{HG,y}$ ),  $BE_y = BE_{HG,y} + BE_{EL,y}$ , so the baseline emission during this monitoring period is  $508,321 + 825,041 = 1,333,362$  tCO<sub>2</sub>e.

### E.2. Project emissions calculation

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According to the applied methodology and the registered PDD, project emissions are the sum of the emissions from onsite fossil fuel.

Project emissions ( $PE_y$ ) comprise:

- CO<sub>2</sub> emissions from fuel coal combustion associated with the production of heat and electricity in the CHP plant; and
- CO<sub>2</sub> emissions from fuel coal combustion in heat-only boilers.

These project emissions are calculated by using following formula based on the “Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion” (Version 02) as follows:

$$PE_y = \sum_j PE_{FC,j,y}$$

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y}$$

$COEF_{i,y}$ , is calculated as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2, i,y}$$

Here:

$EF_{CO2,i,y}$  is 0.0997 tCO<sub>2</sub>/GJ for coal, based on 2006 IPCC default value;

The value of NCV for coal is monitored by PP and the calculation of project emissions from CHP are as follows:



Period	FC <sub>coal,y</sub> (tcoal)	NCV <sub>i,y</sub> (GJ/tcoal)	EF <sub>CO2,i,y</sub> (tCO <sub>2</sub> /GJ)	COEF <sub>Coal,y</sub> (tCO <sub>2</sub> /tcoal)	PE <sub>y</sub> (tCO <sub>2</sub> )
15/10/2011 to 31/10/2011	110,850.49	16.60	0.0997	1.66	183459
01/11/2011 to 30/11/2011	243,256.16	16.91	0.0997	1.69	410112
01/12/2011 to 31/12/2011	263,961.61	16.65	0.0997	1.66	438177
Total	618,068.26				1031748

During this monitoring period, as it's the early stage of heat supplying season and the weather is still not so cool, the heat only boiler houses working as Peak-shaving boilers and supplementary heat sources were not put into operation. So the emission from boiler houses is zero.

The total project emissions can now be calculated as the aggregate of the above, which is 1,031,748tCO<sub>2</sub>e.

### E.3. Leakage calculation

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According to the methodology and the registered PDD, only coal is used in both project activity and the baseline scenario without fuel switch, so the leakage effect from fuel switch is not required for project activity, thus LE<sub>y</sub>=LE<sub>EL,y</sub>.

If  $EG_{PA,y} < EG_{min,hist}$

And

$EF_{grid} > EF_{BL,EL}$

Then

$$LE_{EL,y} = (EG_{min,hist} - EG_{PA,y}) \times (EF_{grid} - EF_{BL,EL})$$

Where:

$EG_{min,hist}$  = Minimum historic annual amount of electricity supplied to the grid over the three most recent years prior to the start of the project activity, the value is 1,916,680, (MWh)

$EG_{PA,y}$  = Monitored actual quantity of electricity supplied by the project activity to the grid in the year y (MWh)

$EF_{grid}$  = Emission factor of the electricity grid system (tCO<sub>2</sub>/MWh)

$EF_{BL,EL}$  = Baseline emission factor for the electricity production, as calculated in the baseline emissions section, the value is 0.9369 (tCO<sub>2</sub>/MWh)

During this monitoring period, the monitored electricity supplied to the grid  $EG_{PA,y}$  is 880,624.044

MWh, and the historical minimum generation ( $EG_{min,hist}$ ) during this monitoring period is

1,916,680\*78/365=409,591.890 MWh (the length of this monitoring period is 78 days). As the historical minimum generation is less than the actually supplied electricity, therefore, according to the AM0058 (version 03.1), the leakage is considered as zero.

### E.4. Emission reductions calculation / table

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According to the applied methodology, the emission reductions in year y (ER<sub>y</sub>) should be calculated as:

$$ER_y = BE_y - PE_y - L_y$$

Total baseline emissions	1,333,362 tCO <sub>2</sub> e
Total project emissions	1,031,748 tCO <sub>2</sub> e
Total leakage	0 tCO <sub>2</sub> e
Total emission reductions	301,614 tCO <sub>2</sub> e

### E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

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Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO <sub>2</sub> e)	246,837	301,614

The estimated annual emission reductions are 1,155,074 tCO<sub>2</sub>e as per registered PDD. According to the length of this monitoring period (78 days), the estimated emission reductions should be 246,837 tCO<sub>2</sub>e.

<b>E.6. Remarks on difference from estimated value in the PDD</b>
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The actual emission reductions during this monitoring period are 301,614 tCO<sub>2</sub>e, which is higher than the estimation in the registered PDD.

### History of the document

Version	Date	Nature of revision
01	EB 54, Annex 34 28 May 2010	Initial adoption.
<b>Decision Class:</b> Regulatory <b>Document Type:</b> Guideline, Form <b>Business Function:</b> Issuance		