

GOLD STANDARD MICRO-SCALE SCHEME PROJECT DESIGN DOCUMENT FORM - Version 01

**Gold Standard Micro Scale Scheme
PROJECT DESIGN DOCUMENT FORM
Version 01 - in effect as of: November 2011**

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SECTION A. General description of micro-scale project activity

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

Energy Efficiency measures in DMRC Phase II stations

07/03/2012, Version 01

A.2. Project participants:

The project participant is Delhi Metro Rail Corporation Ltd., A Joint Venture of Government of India and Govt. of Delhi

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India(Host)	Delhi Metro Rail Corporation Ltd.	No

A.3 Description of the micro-scale project activity:

Energy Efficiency measures in DMRC Phase II stations (hereafter referred to as the “Project”) developed by Delhi Metro Rail Corporation Ltd. (hereafter referred to as the DMRC) is located in state of Delhi, India. The project involves implementation of energy efficiency measures in selected stations of Phase II of Delhi Metro managed by DMRC as listed in A.3.1.4 of PDD.

The baseline scenario identified in section B.4 is the same as the scenario existing prior to the start of implementation of the project activity i.e. Phase II stations implemented as Phase I with no energy efficiency measures

The project also contributes to sustainable development for the wellbeing of the country in terms of environment, socio-economic benefits:

- Social well being: The project activity essentially reduces electricity consumption by the station buildings thus allows the electricity to flow to other important activities in the state. Electricity is one of the basic amenities always in demand due to lack of supply, hence the project contributes towards meeting the electricity needs of the people to the extent the electricity displaced for coming 10 years and thus leading to improvement of quality of life of the people in the state.
- Economic well being: The carbon credit fund expected from the project activity will encourage similar entities for investing in energy efficient projects/ initiative and contribute towards meeting the

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energy demand of the people in the country. A number of metro projects are being developed across country and such projects are expected to replicate the initiative by DMRC.

- Environmental well being: As an objective of all project activity, the project also leads to reduction of GHG emissions from anthropogenic sources. Thus the project leads to overall improvement of environment due to reduced usage of fossil fuels in anthropogenic activities directly or indirectly attributed to the project.

A.3.1. Location of the micro-scale project activity:

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A.3.1.1. Host Country:

India

A.3.1.2. Region/State/Province etc.:

New Delhi

A.3.1.3. City/Town/Community etc.:

Delhi

A.3.1.4. Details of physical location, including information allowing the unique identification of this micro-scale project activity :

The project activity includes 40 over-ground (elevated) metro station buildings forming a part of Phase II of Delhi Metro detailed below. The geographical coordinates for all the stations have been given below:

S No.	Station Name	Station Code	Latitude	Longitude
1	Adarsh Nagar	AHNR	28°42'59.63"	77°10'13.80"
2	Anand Vihar	AVIT	28°38'48.30"	77°18'57.54"
3	Arjanganh	ARJ	28°29'25.42"	77°07'33.57"
4	Azadpur	AZU	28°42'25.26"	77°10'50.23"
5	Botanical Garden	BCGN	28°33'50.07"	77°20'04.08"
6	Dwarka Sector - 8	DSET	28°33'56.24"	77°04'00.94"
7	Ghittorni	GHTI	28°29'37.82"	77°08'59.89"
8	Golf Course	GEC	28°34'01.34"	77°20'45.81"
9	Govindpuri	GDPI	28°32'54.46"	77°15'32.80"
10	Guru Dronacharya	GE	28°29'41.56"	77°06'00.93"
11	Huda City Centre	HCC	28°27'32.97"	77°04'21.26"

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12	Iffco Chowk	IFFCO	28°28'19.06"	77°04'21.21"
13	Jasola Apollo	JLA	28°32'18.07"	77°16'59.25"
14	Jhilmil	JLML	28°40'32.94"	77°18'44.71"
15	Kalkaji Mandir	KJMD	28°32'58.10"	77°15'32.80"
16	Karkardooma	KKDA	28°38'53.59"	77°18'18.58"
17	Lajpat Nagar	LJPN	28°34'13.90"	77°14'10.85"
18	Mansarovar Park	MPK	28°40'31.25"	77°18'05.88"
19	Mayur Vihar Extension	MVPE	28°35'42.00"	77°17'39.59"
20	Mayur Vihar Phase 1	MVP1	28°36'15.34"	77°17'22.35"
21	MG Road	MGRO	28°28'46.60"	77°04'48.27"
22	Model Town	MDTW	28°42'09.82"	77°11'38.22"
23	Mohan Estate	METE	28°31'10.23"	77°17'40.39"
24	Moolchand	MLCD	28°33'50.37"	77°14'02.94"
25	Nehru Place	NP	28°33'05.54"	77°15'06.98"
26	Noida City Centre	NCC	28°34'32.11"	77°21'20.53"
27	Noida Sector - 18	NSET	28°34'14.79"	77°19'34.23"
28	Noida Sector - 15	NSFT	28°35'06.07"	77°18'41.99"
29	Noida Sector - 16	NSST	28°34'42.34"	77°19'03.05"
30	Qutab Minar	QM	28°31'17.21"	77°11'12.05"
31	Sarita Vihar	STVR	28°31'44.04"	77°17'17.63"
32	Satguru Ramsingh Marg	SRSM	28°39'43.51"	77°09'26.96"
33	Shivaji Park	SHVP	28°40'29.81"	77°07'49.32"
34	Sikanderpur	SKRP	28°29'10.11"	77°05'31.89"
35	Sultanpur	SLTP	28°29'56.89"	77°09'41.52"
36	Tughlakabad	TKBD	28°30'08.61"	77°17'57.61"
37	Yamuna Bank	YB	28°40'33.14"	77°16'04.50"

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Figure: Map showing Project Location

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A.3.2. Description including technology and/or measure of the micro-scale project activity:

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The project activity involves energy efficiency measures undertaken by Delhi Metro Rail Corporation (DMRC) in a number of station buildings forming a part of Delhi Metro Phase II. The energy efficiency measures have been undertaken primarily in the Heating, Venting and Air Conditioning (HVAC) system of station buildings. The measures adopted in the HVAC system result in reduction in electrical energy consumption, in comparison to that for a station building forming a part of Phase I of Delhi Metro with similar size (in terms of floor area) and architectural perspectives. This project is retroactive project.

One of the main energy efficiency measure being the implementation of energy efficient VRV (Variable refrigerant volume) type Chillers in the Phase II of DMRC. In Phase I the Split type chillers are used for cooling purposes, whereas in the Phase II more energy efficient VRV type chillers are being used for air-conditioning.

VRV (Variable refrigerant volume) is an air-condition system for commercial building application with sophisticated individual zone control. VRV is a system which means "variable refrigerant volume". In principle it is extremely efficient, reliable, energy saving way to heat and cool all types of buildings with minimum installation time or disruption.

Conventional systems air condition a building as a whole, whereas the VRV system air conditions each room individually. Hence it is ideal for the constantly changing occupancy of a typical building. Even further, precise level control is possible that reacts to the exact conditions in each room.

The VRV System comprises of¹:

- Outdoor air cooled condensing units
- Indoor fancoil units
- Simple refrigerant copper piping
- Power and control cables and
- Remote and centralized controllers for operating the system

Since the project is more energy efficient as compared to Phase I of Delhi Metro, it consumes less electricity and thus results in reduction of Carbon dioxide emissions (CO₂) emissions.

Apart from above mentioned measures, the project also involves other measures to improve energy efficiency through efficient lighting system and more efficient building architecture resulting in maximum utilization of daylight and reduction in cooling requirement.

¹ <http://www.daikintanzania.com/vrv.asp>

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A.3.3 Estimated amount of emission reductions over the chosen crediting period:

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Years	Estimation of annual emission reductions in tonnes of CO ₂ e
2010	4439
2011	7361
2012	7361
2013	7361
2014	7361
2015	7361
2016	7361
2017	7361
2018	7361
2019	7361
Total estimated reductions (tonnes of CO₂e)	70685
Total number of crediting years	10
Annual average of the estimated reductions over the crediting period (tonnes of CO₂e)	7068

A.3.4. Public funding of the micro-scale project activity:

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No public funding from parties included in Annex I of the UNFCCC is involved in this project

SECTION B. Application of an existing baseline and monitoring methodology or of a new methodology submitted as part of this project activity

B.1. Title and reference of the existing or new baseline and monitoring methodology applied to the micro-scale project activity:

Main Category: Type II – Energy efficiency improvement project
AMS-II.E; “Energy efficiency and fuel switching measures for buildings”
Version 10, EB 35

B.2 Justification of the choice of the methodology and applicability:

The project activity is an end-use Energy Efficiency Improvement project that reduces the amount of energy required for delivering or producing non-energy physical goods or services (air conditioning), lighting, station maintenance.

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Applicability Conditions	Justification
This category comprises any energy efficiency and fuel switching measure implemented at a single building, such as a commercial, institutional or residential building, or group of similar buildings, such as a school, district or university. This category covers project activities aimed primarily at energy efficiency; a project activity that involves primarily fuel switching falls into category III.B. Examples include technical energy efficiency measures (such as efficient appliances, better insulation and optimal arrangement of equipment) and fuel switching measures (such as switching from oil to gas).	<u>Applicable and Fulfilled</u> The project activity involves energy efficiency measures with installation of energy efficient systems in the metro stations forming a part of Phase II of Delhi Metro. The project activity leads to reduction in energy consumption by installing efficient equipment (VRV Chillers), lights etc.. Thus this applicability condition is fulfilled.
The technologies may replace existing equipment or be installed in new facilities.	<u>Applicable and Fulfilled</u> The project involves installation of energy efficient VRV system for air conditioning in new stations forming a part of Phase II of Delhi Metro. Thus this applicability condition is fulfilled.
This category is applicable to project activities where it is possible to directly measure and record the energy use within the project boundary (e.g. electricity and/or fossil fuel consumption)	<u>Applicable and Fulfilled</u> The energy consumption in the station building can be directly measured and recorded as electricity consumed in each station. Thus this applicability condition is fulfilled.
This category is applicable to project activities where the impact of the measures implemented (improvements in energy efficiency) by the project activity can be clearly distinguished from changes in energy use due to other variables not influenced by the project activity (signal to noise ratio).	<u>Applicable and Fulfilled</u> The impacts of the energy efficiency measures implemented as part of project activity can be clearly distinguished from changes in energy use due to other variables not influenced by the project activity. Thus this applicability condition is fulfilled.

B.3. Description of the project boundary:

The project boundary in accordance with methodology is “*the physical, geographical site of the building(s)*”. Thus all the stations of Phase II of Delhi Metro as listed in Section A.3.1.4 of PDD form the part of project boundary.

B.4. Description of the baseline and its development as per the chosen methodology:

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>> According to para 5 of AMS-II.E, the baseline is 5 “the energy baseline consists of the energy use of the existing equipment that is replaced in the case of retrofit measures and of the facility that would otherwise be built in the case of a new facility”.

Energy Baseline

The energy baseline for the project activity under consideration is the per square meter electrical energy use of the system of the baseline building (station buildings forming a part of Phase I of Delhi Metro).

For ascertaining the baseline energy consumption, energy consumption of 41 baseline stations of DMRC Phase I was monitored for the year 2010 (Refer Annexure 3). Month wise electricity consumption of each station was tabulated and added to obtain yearly electricity consumption. The monthly electricity consumption data revealed that less electricity is consumed in winter than in summer. This is reasonable since a majority of electricity consumption is attributed to HVAC system. Since the project activity constitutes of only overhead stations and underground stations are much more energy intensive than overhead stations, underground stations were excluded while developing emission factor. This is conservative.

Detailed Calculation Steps and values have been given in Section B.6.1 and B.6.3 of this PDD. The project activity reduces electricity consumption of the stations of Phase II of Delhi Metro in comparison to the baseline scenario. Emission reduction will be based on the reduced electricity drawal from the grid due to the reduced electricity consumption in the stations, in the project scenario compared to the baseline scenario.

Emission factor for electricity drawn from the grid

According to para 6 of AMS-II.E; “each energy form in the emission baseline is multiplied by an emission coefficient. For the electricity displaced, the emission coefficient is calculated in accordance with provisions under category I.D. For fossil fuels, the IPCC default values for emission coefficients may be used.”

Since the project activity leads to reduction in electricity consumptions drawn from North- East- West-North-East (NEWNE) grid, emission coefficient has been calculated for the same. In case of the project activity, a combined margin (CM) emission factor, consisting of the combination of operating margin emission factor and build margin emission factor, calculated by Central Electricity Authority (CEA) according to the procedures prescribed in the ‘Tool to calculate the emission factor for an electricity system’ and made publicly available in the form of CO₂ Baseline Database² (Version 7.0, Dated 1st January 2012) has been considered. The combined margin emission factor for NEWNE grid as per this database is 0.9147 tCO₂/MWh

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered micro-scale project activity:

² http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

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Additionality analysis has been conducted as per Attachment A of Appendix B of the Simplified modalities and procedures for small-scale CDM project activities and Guidelines for demonstrating Additionality of Microscale Project Activities.

According to “Guidelines for demonstrating Additionality of Microscale Project Activities”, EB 63, Annex 23; Energy efficiency project activities that aim to achieve energy savings at a scale of no more than 20 gigawatt hours per year are additional if any one of the conditions below is satisfied:

- a) The geographic location of the project activity is in an LDC/SIDS or special underdeveloped zone of the host country identified by the government before 28 May 2010;
- b) The project activity is an energy efficiency activity with both conditions (i) and (ii) below satisfied:
 - i. Each of the independent subsystems/measures in the project activity achieves an estimated annual energy savings equal to or smaller than 600 megawatt hours;
 - ii. End users of the subsystems or measures are households/communities/SMEs.

In the project activity, all the subsystems (stations) achieve annual energy savings of less than 600 MWh as shown in the excel sheet submitted along with the PDD and end users are communities and local people of the state. Moreover the annual energy savings is estimated to be 8 GWh which is less than 20 GWh per annum. The Kakardooma station has maximum energy savings of 583 MWh for the year 2011, which is less than 600 MWh. Thus the project activity is additional.

Moreover the project also faces barriers to implementation demonstrated below:

Investment barrier- The project involves implementation of energy efficiency measures in stations of Delhi Metro Phase II which involves high investment. One of the main energy efficiency measures includes implementation of VRV type HVAC System instead of split type HVAC system. VRV type system is comparatively costlier³ and involve high investment. Thus implementation of baseline type stations with no energy efficiency measures and no increased investment cost is a more attractive option for PP.

Barrier due to Prevailing Practice- The project involves implementation of energy efficiency measures in stations of Delhi Metro Phase II which involves high risks in terms of investment and technology. DMRC is already operating the Phase I of Delhi Metro which incorporates already tried and tested technologies. Whereas implementation of energy efficiency measures in Phase II involves risks of implementing new technology which are high in investment may fail and not suit the PPs requirement.

Thus the project is additional and would not have been viable in absence of emission reduction benefits.

B.6 Emission reductions:

B.6.1. Explanation of methodological options or description of new proposed approach:
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³ <http://www.climavent.md/eng/The-Multi-talented>

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Emission Reductions:

$$ER_y = BE_y - (PE_y + L_y) \quad \dots\dots\dots(1)$$

Where:

- ER_y = Emission Reductions in the year y (in tCO₂e)
- BE_y = Baseline Emissions in the year y (in tCO₂e)
- PE_y = Project Emissions in the year y (in tCO₂e)
- L_y = Leakage Emissions in the year y (in tCO₂e)

Project Emissions

For the project activity under consideration, the emission reductions will be computed on the basis of the net amount of electrical energy consumption reduction w.r.t the baseline scenario. Therefore, there will be no project emissions arising out of additional electricity consumption under the project activity. So, project emissions (PE_y) = 0

Baseline Emissions

Baseline emissions have been computed by multiplying the energy savings achieved and the emission coefficient for NEWNE grid.

$$BE_y = ES_y * EF_y \quad \dots\dots\dots(2)$$

Where:

- BE_y = Baseline Emissions in year y (in tCO₂e)
- ES_y = Total Energy savings the given year y (in MWh)
- EF_y = Emission Coefficient for the NEWNE grid (in tCO₂/MWh)

Step 1: Estimation of Energy Savings in the given year y

$$ES_y = \sum_{m=1}^{m=n} ES_m \quad \dots\dots\dots(3)$$

Where:

- ES_y = Total Energy savings the given year y (in MWh)
- m = Month in the year y
- ES_m = Total Energy Savings in a given month m (in MWh)

Step 2: Estimation of Energy Savings in the given month m

$$ES_m = \left(\sum_{ST=1}^{ST=n} ES_{ST} \right) \div 1000$$

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Where:(4)

ES_m	=	Total Energy Savings in a given month m (in MWh)
ES_{ST}	=	Energy Savings for a given station in a given month m (in kWh)
ST	=	Station included in the project activity

Step 3: Estimation of Energy Savings for a station in a given month

$$ES_{ST} = \eta_{f,m} \times A_{ST,m} \quad \text{.....(5)}$$

Where:

ES_{ST}	=	Energy Savings for a given station in a given month m (in kWh)
η_f	=	Per square meter savings in the given month
$A_{ST,m}$	=	Operational area for a given station in a month m (in sq.m)

Step 4: Estimation of Per Unit Energy Efficiency Factor

$$\eta_{f,m} = \eta_{BL,m} - \eta_{PJ,m} \quad \text{.....(6)}$$

Where:

$\eta_{f,m}$	=	Per sqm Energy savings of the project station
$\eta_{BL,m}$	=	Per sqm Energy Consumption factor for the Baseline Stations in the given month for the year 2010
$\eta_{PJ,m}$	=	Per sqm Energy Consumption factor for the Project Activity in the given month for the year 2010

Step 5: Estimation of Per Unit Energy Efficiency Factor for Baseline Stations

$$\eta_{BL,m} = \left(\sum_{ST,BL=1}^{ST,BL=n} EC_{BL,m} \right) \div \left(\sum_{ST,BL=1}^{ST,BL=n} A_{BL} \right) \quad \text{.....(7)}$$

Where:

$\eta_{BL,m}$	=	Per Unit Energy Consumption factor for the Baseline Stations for a given month m of year 2010
ST	=	Station included in the baseline
$EC_{BL,m}$	=	Energy Consumption for all the stations included in baseline stations of Phase I (in kWh)
A_{BL}	=	Area of all the stations included in baseline stations of Phase I (in sq.m)

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Step 6: Estimation of Per Unit Energy Efficiency Factor for Project Stations

$$\eta_{PJ,m} = \sum_{ST=1}^{ST=n} (EC_{PJ,m} \div A_{ST,m}) \dots\dots\dots(8)$$

Where:

- $\eta_{PJ,m}$ = Per Unit Energy Consumption factor for the Project Stations for a given month m
- ST = Station included in the project activity
- $EC_{PJ,m}$ = Energy Consumption for active stations included in project activity (in kWh)
- $A_{ST,m}$ = Area of operational stations included in project activity (in sq.m)

Leakage Emissions

There are no leakage emissions from the project activity.

B.6.2. Data and parameters that are available at validation:

(Copy this table for each data and parameter)

Data / Parameter:	EF _y
Data unit:	t CO ₂ /MWh
Description:	CO ₂ emission factor for the regional grid system
Source of data used:	CEA published grid emission factors
Value applied:	0.9147 tCO ₂ /MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	Central Electricity Authority (CEA) database, version 7 dated March 2011 values have been used for authenticity of the data, available publicly by Govt of India with a view to obtain uniformity of approach in the country towards a common objective.
Any comment:	http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

Data / Parameter:	EC _{BL,m}
Data unit:	kWh
Description:	Energy consumption in the baseline stations in a given month
Source of data used:	Existing records for Delhi Metro Phase I provided by DMRC
Value applied:	Detailed in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The energy consumption data has been taken from the existing records maintained by DMRC on electricity consumption for the year 2010 in the stations covered under Phase I of Delhi Metro.
Any comment:	

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Data / Parameter:	A _{BL}
Data unit:	Sq.m
Description:	Area of all the stations included in baseline stations of Phase I
Source of data used:	Delhi Metro Phase I records provided by DMRC Limited
Value applied:	Detailed in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The area of the stations has been taken from the records maintained by DMRC Limited
Any comment:	

Data / Parameter:	A _{ST}
Data unit:	Sq.m
Description:	Area of all the stations included in project activity
Source of data used:	Delhi Metro Phase II records provided by DMRC Limited
Value applied:	Detailed in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The area of the stations has been taken from the records maintained by DMRC Limited
Any comment:	

Data / Parameter:	$\eta_{BL,m}$										
Data unit:	kWh/sqm										
Description:	Per sqm Energy Consumption factor for the Baseline Stations in the given month for the year 2010										
Source of data used:	Calculated										
Value applied:	<table border="1"> <thead> <tr> <th>Month</th><th>Energy Consumption Factor for the baseline (in kWh/sqm)</th></tr> </thead> <tbody> <tr> <td>January</td><td>5</td></tr> <tr> <td>February</td><td>5</td></tr> <tr> <td>March</td><td>6</td></tr> <tr> <td>April</td><td>7</td></tr> </tbody> </table>	Month	Energy Consumption Factor for the baseline (in kWh/sqm)	January	5	February	5	March	6	April	7
Month	Energy Consumption Factor for the baseline (in kWh/sqm)										
January	5										
February	5										
March	6										
April	7										

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	May	7	
	June	6	
	July	7	
	August	6	
	September	6	
	October	6	
	November	5	
	December	5	
Justification of the choice of data or description of measurement methods and procedures actually applied :	This is a calculated parameter.		
Any comment:			

B.6.3 Ex-ante calculation of emission reductions:

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According to methodology, emission reductions are given as:

$$ER_y = BE_y - (PE_y + L_y)$$

Where:

ER_y = Emission Reductions in the year y (in tCO₂e)

BE_y = Baseline Emissions in the year y (in tCO₂e)

PE_y = Project Emissions in the year y (in tCO₂e)

L_y = Leakage Emissions in the year y (in tCO₂e)

Baseline Emissions

For estimating baseline energy consumption; the consumption units per square meter of built-up area for each month during the year 2010 has been calculated for Phase I stations. Assuming that the project activity had not been executed, the Phase II stations would have installed the energy consuming equipments as in Phase I. In such a scenario, the energy consumed by Phase II stations have been calculated by multiplying the built-up area of each operational station with consumption unit per square meter for each month during the year 2010 in absence of project systems. Thus this gives the energy consumption in baseline stations (Phase II) in absence of project activity. On comparing the same with the actual energy consumption in Phase II stations during the year 2010, it was found that due to energy efficient measures adopted in Phase II, there has been a reduction in total energy consumption.

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Estimation of Per Unit Energy Efficiency Factor for Project Stations: Has been detailed in Annex 3 of PDD

$$\eta_{PJ,m} = \sum_{ST=1}^{ST=n} (EC_{PJ,m} \div A_{PJ})$$

Estimation of Per Unit Energy Efficiency Factor for Baseline Stations

$$\eta_{BL,m} = \left(\sum_{ST,BL=1}^{ST,BL=n} EC_{BL,m} \right) \div \left(\sum_{ST,BL=1}^{ST,BL=n} A_{BL} \right)$$

=

Month	Energy Consumption Factor for the baseline (in kWh/sqm)
January	5
February	5
March	6
April	7
May	7
June	6
July	7
August	6
September	6
October	6
November	5
December	5

Estimation of per Unit Energy Efficiency Factor: has been detailed in Annex 3 of PDD

$$\eta_{f,m} = \eta_{BL,m} - \eta_{PJ,m}$$

Estimation of Energy Savings for a station in a given month: has been detailed in Annex 3 of PDD

$$ES_{ST} = \eta_{f,m} \times A_{ST,m}$$

Estimation of Energy Savings in the given month m: has been detailed in Annex 3 of PDD

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$$ES_m = \left(\sum_{ST=1}^{ST=n} ES_{ST} \right) \div 1000$$

Estimation of Energy Savings in the given year y

$$ES_y = \sum_{m=1}^{m=n} ES_m$$

For the Year 2010= 4853 MWh

For the Year 2011 onwards= 8047 MWh

Baseline emissions have been computed by multiplying the energy savings achieved and the emission coefficient for NEWNE grid.

$$BE_y = ES_y * EF_y$$

For the Year 2010:

$$\begin{aligned} BE_y &= 4853 * 0.9147 \\ &= 4439 \\ 7361 \end{aligned}$$

For the Year 2010:

$$\begin{aligned} BE_y &= 8047 * 0.9147 \\ &= 7361 \end{aligned}$$

Project Emissions:

Project does not have any project emissions, thus $PE_y = 0$.

Leakage Emissions:

Project does not have any leakage emissions, thus $LE_y = 0$.

B.6.4 Summary of the ex-ante estimation of emission reductions:
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Year	Estimation of project activity emissions	Estimation of baseline emissions (tonnes)	Estimation of leakage (tonnes of CO ₂ e)	Estimation of overall emission reductions
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	(tonnes of CO ₂ e)	of CO ₂ e)		(tonnes of CO ₂ e)
2010	0	4439	0	4439
2011	0	7361	0	7361
2012	0	7361	0	7361
2013	0	7361	0	7361
2014	0	7361	0	7361
2015	0	7361	0	7361
2016	0	7361	0	7361
2017	0	7361	0	7361
2018	0	7361	0	7361
2019	0	7361	0	7361
Total (tonnes of CO₂e)	0	70685	0	70685

B.7 Application of a monitoring methodology and description of the monitoring plan as per the existing or new methodology applied to the micro-scale project activity:
B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)

Data / Parameter:	EC _{PJ,m}
Data unit:	kWh
Description:	Energy Consumption for all the stations included in project activity
Source of data to be used:	Site Records maintained by DMRC on electricity consumption for all the stations covered by the project activity and are part of Phase II of Delhi Metro
Value of data	To be monitored. Provided in Annex 3 for 2011
Description of measurement methods and procedures to be applied, inc. frequency:	The data will be measured continuously and will be recorded every month for all the station buildings using electricity meter in log books.
QA/QC procedures to be applied:	The electricity would be maintained in line with the state electricity board's requirement.
Any comment:	The data archived will be maintained for crediting period +2 years. The data archiving will be done on both paper and electronically.

B.7.2 Description of the monitoring plan:

>>

DMRC proposes the following structure for data monitoring, collection, data archiving and calibration of equipments for this project activity. DMRC will be the responsible entity for all monitoring and would set the procedures verifying the VERs generated by the power project annually.

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Monitoring Plan Objective and Organization

The project proponent (DMRC) will monitor the electricity consumed in all the station buildings forming the part of project activity. The data will be archived electronically and be stored for 2 years after the end of the crediting period.

To ensure that the data is reliable and transparent, the project entity will also establish Quality Assurance and Quality Control (QA&QC) measures to effectively control and manage data reading, recording, auditing as well as archiving data and all relevant documents. The data will be monitored on a monthly basis and will be submitted to Quality Assurance team of project proponent.

1. Quality Assurance and Quality Control

QA&QC procedures for recording, maintaining and archiving data shall be implemented as part of this Gold Standard project activity.

The project proponent will implement QA&QC measures to ensure the accuracy of metering and safety aspects of the project operation. The metering devices will be inspected properly and periodically, according to state electricity board's specifications and requirements to ensure accuracy in the readings.

2. **Training and maintenance procedures:** Carbon credit Quality Advisor would ensure training to on-site staff with respect to adherence to the Monitoring Plan of the project activity. Records of the training would be kept.

Internal audit of all the records of the plant will be carried out twice a year. During these audits all the data and parameters that need to be monitored as per the monitoring plan would be checked and shortcomings if any will be reported and addresses.

3. Data Storage and Archiving

In order to facilitate auditors' reference and for any future requirement, relevant literature relating to the project such as the project material and monitoring results will be indexed. All the data items monitored under the monitoring plan will be kept for 2 years after the end of crediting period or till the last issuance of VERs for this project activity, whichever occurs later. The data will be maintained in both electronic and paper formats. The data will be stored in following manner:

- A copy of data will be maintained in electronic and paper format on-site for anytime reference and validation. The energy consumption per station data and calibration certificates of all stations will be maintained in the E&M Division of DMRC, Metro Bhawan. The operational area for each station will be stored in the Civil Division of DMRC, Metro Bhawan.
- A copy of data will be stored in paper format by project operator in their branch office in safe storage.

B.8	Date of completion of the application of the existing or new baseline and monitoring
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methodology and name of the responsible person(s)/entity(ies)

>>

Date of completion: 7 March 2012
SENES Consultants India Pvt. Ltd.*
1st Floor, Tower B, Logix Techno Park
Sector 127, Noida

*The above entity is not a project participant.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>

1/01/2010 (As per Gold standard Rules and Procedure, Retroactive crediting for all projects submitting documentation (GS Validation report) after October 31st 2007 is only possible for a maximum of two years prior to the date of registration to the Gold Standard. The earliest start date for retroactive crediting is January 1st 2010)

However the start date of the operation of the stations of phase II are provided below:

Sl.no.	Name of station	Station code	Start date
1	Adarsh Nagar	AHNR	Feb-09
2	Anand Vihar ISBT	AVIT	Jan-10
3	Arjangarh	ARJ	Jun-10
4	Azadpur	AZU	Feb-09
5	Botanical Gardn	BCGN	Nov-09
6	Dwarka Sector 8	DSET	Oct-10
7	Ghittorni	GHTI	Jun-10
8	Golf Course	GEC	Nov-09
9	Govindpuri	GDPI	Oct-10
10	Guru Dronacharya	GE	Jun-10
11	Huda City Centre	HCC	Jun-10
12	Iffco Chowk	IFFCO	Jun-10
13	Jasola	JLA	Oct-10
14	Jhilmil	JLML	Jun-08

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15	Kalkaji Mandir	KJMD	Oct-10
16	Karkardooma	KKDA	Jan-10
17	Lajpat Nagar	LJPN	Oct-10
18	Mansoravar	MPK	Jun-08
19	Mayur Vihar Extension	MVPE	Nov-09
20	Mayur Vihar Phase I	MVP1	Nov-09
21	MG Road	MGRO	Jun-10
22	Model Town	MDTW	Feb-09
23	Mohan Estate	METE	Jan-11
24	Moolchand	MLCD	Oct-10
25	Nehru Place	NP	Oct-10
26	Noida City Centre	NCC	Nov-09
27	Noida Sector Eighteen	NSET	Nov-09
28	Noida Sector Fiftn	NSFT	Nov-09
29	Noida Sector Sixteen	NSST	Nov-09
30	Qutub Minar	QM	Jun-10
31	Sarita Vihar	STVR	Oct-10
32	Satguru Ramsingh Marg	SRSM	40269
33	Shivaji Park	SHVP	Jan-10
34	Sikanderpur	SKRP	Jun-10
35	Sultanpur	SLTP	Jun-10
36	Tughlakabad	TKBD	Jan-10
37	Yamuna Bank	YB	May-09

C.1.2. Expected operational lifetime of the project activity:

>>

30 years

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C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

>>

Not applicable

C.2.1.2. Length of the first crediting period:

>> Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

1st January 2010

C.2.2.2. Length:

>>

10 years, 0 months

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SECTION D. Stakeholders' comments

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D.1. Brief description of the means used to invite local stakeholders for comments:

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The project being implemented across the National Capital Region of India and since it effects a large proportion of residents of Delhi-NCR, DMRC gives specific importance to Local stakeholders participation in the project. For DMRC the stakeholder's consultation is an ongoing process and a measure to improve its service. The local stakeholder consultation for the project is divided into two parts.

1. During and prior to construction of the stations.

Stakeholder's consultation was conducted for the Phase II of Delhi Metro wherein main stakeholders were general public (users of the metro) and persons living near construction sites of the metro were consulted with. Their issues and concerns were identified and appropriate measures were taken to address the same.

Persons living near to construction sites of stations and metro line are one of the stakeholders potentially affected by these activities. They are also the maximum beneficiary from the project activity in terms of cost of transport. DMRC organized interfaces in form of Public Grievance and Redressal Forum with the affected communities near to the construction sites. After receiving feedback from the concerned departments, reply is given to the parties within a short period of time. Important is in this context also the Right to Information Act. Interactive programmes were organized before, during and at post construction stages.

The detailed process of this consultation is available for validation, however the section summaries the process and outcome.

2. During operation of metro

The commuters of Delhi metro (estimated to be more than 2 Lakh per day) and the user of metro station as identified under this project activity becomes the main stakeholders during operation. It is DMRC's endeavour to consistently take stakeholders feedback during operation and improve it's level of services. DMRC also has a helpline number (24 Hours DMRC Helpline No.: +91-11-155370) which receives around 2 thousand calls per month. All the comments are noted and appropriate actions are taken to address the stakeholders concern. The general public can also provide feedback by visiting DMRC website (<http://www.delhimetrorail.com/feedback.aspx>). Local stakeholders can also fill in online feedback forms (<http://www.delhimetrorail.com/Feedback-Form-on-Metro-Services.aspx>) or submit the same at stations (http://delhimetrorail.com/OtherDocuments/Feedback_Form.pdf)

DMRC participates in exhibitions and made a radio programme with interactive phone-in to proactively interact with stakeholders.

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General public are the users of the public transport system and the prime beneficiaries. Communication with the general public was done through street plays and associating children for experimental joyrides etc. Furthermore, people were asked on their satisfaction with metro services in terms such as speed, convenience, cleanliness, safety, ambience and cost of service.

D.2. Summary of the comments received:

>>

At construction sites, main concerns were about disruptions of services, congestion and other inconveniences of daily life related to the direct (e.g. noise, dust) or indirect (e.g. congestion) construction impacts. Grievances of the citizens were recorded and actions were taken for immediate relief.

During operation phase the main concerns are related to cleanliness, safety, long waiting time, frequency and parking facilities. DMRC records all such stakeholders comment and takes appropriate actions to enhance stakeholder's satisfaction

Surveys realized with general public show that people are very satisfied with metro services and are satisfied with all aspects such as cost, safety, convenience, speed etc.

D.3. Report on how due account was taken of any comments received and on measures taken to address concerns raised:

>>

For construction activities, DMRC reduced the magnitude of inconveniences on the one hand by a proactive information policy thus allowing people to take counter-measures and on the other hand by reducing to a minimum construction time and reacting rapidly with repairs e.g. if pipes were broken during construction. Examples include that all traffic diversions were planned in advance and a scientific study was conducted.

Also alternative roads, traffic signals and road widening were ensured before effecting diversions. All public utilities like telephone cables, sewer lines, electricity cables and water pipelines which directly affect the lives of the common man were diverted well in advance to avoid inconvenience. It was done through media reports, advertising and community interaction programmes.

Important in this context was that people were well and timely informed about work plans and potential inconveniences including advance information on disruptions and deviations of public utility services such as electricity or water supply. Also more than 3,000 site visits were organized for all segments of stakeholders at metro construction sites.

D.4. Report on stakeholder consultation feedback round:

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Stakeholder Feedback round by the Gold standard representative in not yet conducted.

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Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Delhi Metro Rail Corporation Ltd.
Street/P.O.Box:	Fire Brigade Lane, Barakhamba Road
Building:	Metro Bhawan
City:	New Delhi
State/Region:	New Delhi
Postfix/ZIP:	110001
Country:	India
Telephone:	23417910/12
FAX:	23417921
E-Mail:	
URL:	http://www.delhimetrorail.com/
Represented by:	
Title:	Dy. CEO (AGM)
Salutation:	Mr.
Last Name:	Verma
Middle Name:	Adhar
First Name:	Sant
Department:	Planning
Mobile:	+91-981106868
Direct FAX:	+91-22483216/227
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Personal E-Mail:	saverma_rs@yahoo.com

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Annex 2

Information regarding Public Funding

The Project activity is partially financed by the Government of Japan through JBIC. The funding however is separate from and is not counted towards the financial obligations of the aforesaid party. The relevant documents have been submitted to the validator.

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Annex 3 **Baseline Information**

According to para 5 of AMS-II.E, the baseline is 5 “*the energy baseline consists of the energy use of the existing equipment that is replaced in the case of retrofit measures and of the facility that would otherwise be built in the case of a new facility*”.

Energy Baseline

The energy baseline for the project activity under consideration is the per square meter electrical energy use of the system of the baseline building (station buildings forming a part of Phase I of Delhi Metro).

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	Phase I Energy Consumption (kWh)			2010											
	STATION NAME	STATION CODE	Active Built up area(in sqm)	January	February	March	April	May	June	July	August	September	October	November	December
1	Dwarka Mor	DM	4595	27830	39792	21229	39715	43892	42803	42862	40608	35165	37086	31156	25623
2	Dwarka Sector- 10	DST	5352	19788	20248	23628	25150	25430	24367	24914	22657	22070	23040	20995	20245
3	Dwarka Sector 12	DSW	5352	20850	18887	25585	30180	32027	32168	30751	29522	29650	32838	28569	28790
4	Dwarka Sector- 9	DSN	5352	30780	27846	35254	37387	45813	41717	44294	41502	37200	35154	33286	30087
5	Dwarka Sector-11	DSE	5142	18461	18959	23449	24430	22930	22020	22080	22080	23030	26087	23580	24610
6	Dwarka sector-13	DSTN	5141.73	13058	10489	13969	16430	24370	15928	17334	14031	8890	16175	13960	13080
7	Dwarka sector-14	DSFN	5352	16581	18324	24799	25070	25740	25647	23851	23170	23870	28340	25270	25690
8	Inder Lok	ILOK	5251	36267	34887	41261	38701	39237	42883	38662	37349	36058	34750	30947	31651
9	Indraprastha	IDPT	10821.8	27557	25628	30452	34527	37399	35651	45766	35371	37879	42678	33858	11677
10	Janakpuri East	JPE	8056	27525	41297	21012	41663	45807	42462	39806	39711	36218	38413	28194	28600
11	Janakpuri west	JPW	5002	36917	46430	28232	41819	45923	41975	41750	44018	40534	42725	36562	36094
12	Jhandewalan	JW	8075	27180	24512	30524	36310	40009	39047	37678	37728	31592	31602	24521	23203
13	Kanhaiya Nagar	KN	5740	23567	22741	33864	34464	35659	35730	35113	32640	33832	31510	27866	27546
14	Kirti Nagar-I	KN	8278	31756	30605	39202	84137	6175	45467	47983	45231	43876	42199	37607	37974
15	Karol Bagh	KB	7574	31493	18468	46682	25256	37858	34602	39030	40110	37163	38097	28726	31949
16	Kohat Enclave		5760	34914	31104	39600	42500	47055	45169	46645	41382	38740	34925	36981	34330
17	Moti Nagar	MN	7381	26428	26625	37256	44625	44565	39961	40925	37661	37060	38160	35917	35462
18	Netaji Subhash Place	NSHP	5875	32987	30069	36401	43160	43612	41926	42514	39789	35951	40545	36333	34287
19	Patel Nagar	PN	7639	40519	32898	44198	51239	54965	50211	51679	51262	46520	49114	35159	39123
20	Pitam Pura	PTP	6070	34017	31625	36937	42290	21342	43290	41821	45896	40482	43540	28350	34401
21	Pratap Nagar	PRA	5666	38843	36914	40357	47803	52655	45291	47250	42606	45081	44058	37266	36993
22	Pul Bangash	PBGH	6625	33117	29776	36953	44031	42921	39653	43275	39091	36178	37807	32008	32681
23	Rajendra Palace	RP	8870	28554	23785	35160	43859	48759	43069	45985	39096	35705	35870	27417	29370
24	Nawada	NWDA	5317	27966	38872	23844	40626	44302	40488	39911	36111	37276	32807	28094	28590
25	Rajouri Garden	RG	10358	49432	42925	56208	64589	67312	-24441	68296	57672	52450	54899	51347	52421
26	Ramakrishna Ashram	RKAM	8174	33955	32586	39413	45077	49491	47313	45842	41753	38966	45129	29446	33620
27	Ramesh Nagar	RN	8233	28226	25960	35799	41960	43497	42029	39606	35389	33304	34337	28380	1797
28	Rithala	RI	7335	40871	38761	45938	48348	52477	51840	46744	52676	47576	48711	40156	42776
29	Rohini East	RHE	6171	35449	34153	40977	43717	47769	43833	43034	43559	39694	41702	36114	36446
30	Rohini West	RHW	8950	23807	20385	24056	29096	26597	25839	24988	26291	23243	23181	22560	22016
31	Seelampur	SLAP	8827	35047	33903	37839	42013	44054	43985	42846	37286	34289	38556	32581	38124
32	Shadipur	SP	5914	33545	31026	39367	42489	45007	40328	41459	39396	37772	37119	30083	32570
33	Shahdara	SHD	12152	55525	48816	57930	61484	67099	65126	65651	65149	58669	67204	58471	57636
34	Shastri Nagar	SN	5478	29227	26993	30753	38297	38404	35346	34006	31571	32091	32313	28209	28443
35	Shastri Park	SHPK	3267	156249	152822	197566	213075	229132	230493	223423	170315	207532	198023	169946	154998
36	Subhash Nagar	SN	8699	29644	28619	41288	48463	49369	47220	48982	48162	43752	43928	36725	37236
37	Tagore Garden	TG	7605	32937	33005	31727	31448	33695	30650	31974	33273	32254	32080	32741	33121
38	Tis Hazari	TZI	9900	42348	41084	46867	58232	58780	53908	58650	50057	51906	53639	48121	45491
39	Uttam Nagar East	UNE	5334	29454	44146	23301	43895	45165	45094	43651	40725	35032	35131	28106	29711
40	Uttam Nagar West	UNW	5463	27991	41683	21347	41405	43091	41959	39395	36683	30716	42774	31669	28932
41	Welcome	WC	8827	35398	30815	38895	41472	42072	43059	38178	40869	34662	41152	33355	32775
	Total Monthly Energy Consumption	ECBL,m	kWh	1406060	1388463	1579119	1870432	1891456	1775106	1868604	1729448	1660378	1727398	1460632	1410169
	Total Area of all station	ABL	284973												
	Per SQM Energy consumption for the month	η_{BLm}		4.93	4.87	5.54	6.56	6.64	6.23	6.56	6.07	5.83	6.06	5.13	4.95

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Phase II Project Activity (project energy consumption kWh)				2010											
	Name of Station	Station Code	Active Builtup Area (in Sq.m)	January	February	March	April	May	June	July	August	September	October	November	December
1	Adarsh Nagar	AHNR	7187	27328	22741	28124	30794	33323	32087	32024	31711	30038	31774	28504	28496
2	Anand vihar ISBT	AVIT	9880	21089	50298	60976	57817	30847	10776	9700	34365	31357	27326	27409	27409
3	Arjangarh	ARJ	10974	0	0	0	0	0	0	27254	28431	25606	25399	21010	22840
4	Azadpur	AZU	8421	28966	27077	31356	35141	36527	35430	32109	32802	32854	34945	30654	32454
5	Botanical Garden	BCGN	6815	25912	23434	25729	41880	41164	38747	23862	30790	33489	27319	27840	17533
6	Dwarka Sector- 8	DSET	5133	0	0	0	0	0	0	0	0	0	0	0	20000
7	Ghittorni	GHTI	10961	0	0	0	0	0	0	34187	34792	34890	34649	31440	32260
8	Golf Course	GEC	7044	26350	23440	25758	29187	36213	34996	35082	34865	31877	32085	32393	33071
9	Govindpuri	GDPI	8015	0	0	0	0	0	0	0	0	0	21233	30050	33817
10	Guru Dronacharya	GE	11198	0	0	0	0	0	0	50040	45270	46460	49577	45347	47428
11	Huda city Centre	HCC	10689	0	0	0	0	0	0	57190	28246	38950	39179	34649	30979
12	Iffco Chowk	IFFCO	11145	0	0	0	0	0	0	41585	40210	41470	39358	40260	37988
13	Jasola Apollo	JLA	12863	0	0	0	0	0	0	0	0	0	37386	30829	28853
14	Jhilmil	JLML	8148	30805	27525	36797	42845	41128	39426	38214	38701	36819	38991	31129	30471
15	Kalkaji	KJMD	9165	0	0	0	0	0	0	0	0	0	30402	29285	30786
16	Karkardooma	KKDA	14346	21250	31805	32247	35205	36637	35432	44541	44104	57315	55029	52196	59266
17	Lajpat Nagar	LJPN	9218	0	0	0	0	0	0	0	0	0	38916	41914	41245
18	Mansarovar Park	MPK	8149	0	0	0	0	0	0	0	0	0	0	0	0
19	Mayur vihar extension	MVPE	8485	26350	23660	26350	27250	28880	27220	23050	23019	19919	19770	16049	17243
20	Mayur Vihar Phase I	MVP1	8485	26350	23366	25835	33195	35444	33389	29677	19883	27053	23329	27324	18197
21	MG road	MGRO	12157	0	0	0	0	0	0	41710	40440	41000	41488	38562	40454
22	Model Town	MDTW	7187	22481	22650	27535	28831	26505	29420	26099	22598	23733	28051	23064	21317
23	Mohan estate	METE	8256	0	0	0	0	0	0	0	0	0	0	0	0
24	Moolchand	MLCD	9128	0	0	0	0	0	0	0	0	0	33538	30214	31883
25	Nehru Place	NP	9884	0	0	0	0	0	0	0	0	0	36102	43740	43721
26	Noida city Centre	NCC	6230	26154	32012	40948	40827	38453	37896	40307	38515	38242	35605	29383	23921
27	Noida sec eighteen	NSET	6121	26350	23325	25501	22502	24345	21846	23582	21021	20416	19016	19946	17890
28	Noida Sec Fiftn	NSFT	6272	25646	23272	25524	23551	24918	25367	24698	20922	21096	18619	18055	17161
29	Noida Sec sixteen	NSST	6256	26350	23540	25754	27148	28381	27593	27361	23568	25546	24130	22843	20048
30	Qutab Minar	QM	10139	0	0	0	0	0	0	48210	46582	44540	46170	40964	41685
31	Sarita Vihar	STVR	7612	0	0	0	0	0	0	0	0	0	18436	30434	32407
32	SATGURU RAMSINGH MARG	SRSM	5228	0	0	0	0	0	0	0	0	0	0	0	0
33	SHIVAJI PARK	SHVP	9005	0	0	0	0	27214	41312	39964	39616	36782	35328	34240	35843
34	Sikanderpur	SKRP	11215	0	0	0	0	0	0	0	37200	36000	34350	31727	31164
35	Sultanpur	SLTP	14936	0	0	0	0	0	0	48966	48760	45380	46060	43070	42940
36	Tughlakabad	TKBD	12933	0	0	0	0	0	0	0	0	0	0	0	0
37	Yamuna Bank	YB	10000	47468	32316	43097	47805	49000	49889	25432	47095	44375	46087	38744	39150

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				Project Energy Consumption 2011											
	Name of Station	Station	Active	January	February	March	April	May	June	July	August	September	October	November	December
1	Adarsh Nagar	AHNR	7187	28510	25184	29053	31925.49	32501	29973	32031	34338	31287	31850	29290	29318
2	Anand vihar ISBT	AVIT	9880	20875	29342	26604	24285	26071	67721	39489	39821	56730	51812	45176	23724
3	Arjangarh	ARJ	10974	21293	21186	21663	25735	27343	25746	27690	27657	27610	26225	22120	19842
4	Azadpur	AZU	8421	33496	27847	33100	34101.33	36814	36119	35450	36224	34623	35490	34149	33023
5	Botanical Garden	BCGN	6815	34055	40222	38052	33316	33677	37098	39283	38561	36808	28416	25383	23935
6	Dwarka Sector- 8	DSET	5133	20000	20000	30000	30000	30000	30000	30000	30000	23904	24381	24230	24811
7	Ghittorni	GHTI	10961	32173	28901	33725	33422	37127	34553	33643	34740	31107	35786	32270	31237
8	Golf Course	GEC	7044	33101	33539	32606	31949	31613	31794	31507	31066	48277	47712	42031	41175
9	Govindpuri	GDPI	8015	31384	31050	38911	39706	40967	39238	38670	39227	39587	39949	37399	36747
10	Guru Dronacharya	GE	11198	46209	42964	49649	48280	52469	48810	50066	49597	49559	48678	45748	46046
11	Huda city Centre	HCC	10689	27148	26534	32496	35669	39649	37758	35235	35129	34896	33097	30198	28630
12	Iffco Chowk	IFFCO	11145	35542	32899	38563	38355	42721	38884	38753	38795	38145	36758	36840	35787
13	Jasola Apollo	JLA	12863	27972	28410	40555	40360	46455	42866	42362	42655	42335	38190	35100	34730
14	Jhilmil	JLML	8148	30678	27379	33704	39407.66	40778	38605	37425	38992	38300	37310	33737	34575
15	Kalkaji	KJMD	9165	29448	31692	35360	36285	38666	36471	35237	35645	34887	34864	34019	32507
16	Karkardooma	KKDA	14346	65955	31847	29641	25170	33057	30750	32030	28006	41280	33048	31224	29468
17	Lajpat Nagar	LIPN	9218	39370	37550	31822	40527	40411	39831	39211	41082	42446	41956	42420	36395
18	Mansarovar Park	MPK	8149	29156	24687	28739	35504.49	36183	38005	37375	42068	36695	37720	32929	32860
19	Mayur vihar extension	MVPE	8485	26549	17905	28009	28530	28540	28496	28984	28633	25125	20811	22165	20439
20	Mayur Vihar Phase I	MVP1	8485	30000	30000	25524	27667	29956	23086	34503	34219	33989	33987	34142	33987
21	MG road	MGRO	12157	38935	35796	39249	42469	45898	43200	43014	44488	44104	42523	41281	42689
22	Model Town	MDTW	7187	20129	17971	20548	24306.33	26456	24928	25084	26640	28150	23661	20089	18542
23	Mohan estate	METE	8256	18623	31556	35928	33795	38822	38643	37721	36831	35938	33908	32632	29848
24	Moolchand	MLCD	9128	33515	29560	33416	32941	38654	40776	40797	41245	38938	36129	32693	32326
25	Nehru Place	NP	9884	43690	41870	48626	50824	55925	45062	40108	35589	38370	36363	43010	44277
26	Noida city Centre	NCC	6230	18091	33539	32606	31949	44723	30504	34857	30636	38516	36410	32447	32137
27	Noida sec eighteen	NSET	6121	16636	16755	17707	18697	23075	21881	22265	21848	34222	28338	28221	28364
28	Noida Sec Fiftn	NSFT	6272	17118	16239	20372	22300	26031	21306	22647	22382	23347	20043	21130	19271
29	Noida Sec sixteen	NSST	6256	20164	18015	21645	23373	28214	26871	27129	27497	30611	36927	37834	27157
30	Qutab Minar	QM	10139	40057	37595	43506	44982	50823	49178	49266	49331	48843	49147	46464	46744
31	Sarita Vihar	STVR	7612	32553	32374	36406	31058	41563	48449	48545	41815	42494	35158	36832	35280
32	MARG	SRSM	5228	0	0	0	0	0	0	0	0	25699	25645	22959	22560
33	SHIVAJI PARK	SHVP	9005	36704.49	33333	37352	36611	40908	39204	38265	38731	37619	35292	32779	33625
34	Sikanderpur	SKRP	11215	30171	32941	31853	45398	36473	40890	42241	41915	43513	42638	38299	40546
35	Sultanpur	SLTP	14936	44439	42803	51581	53575	57840	53252	56333	57261	56859	56761	53155	53701
36	Tughlakabad	TKBD	12933	4059	32675	39102	40624	45533	48342	45633	45135	43131	37820	32907	31769
37	Yamuna Bank	YB	10000	38595	36067	46968	40307	42851	49132	47642	46295	32451	33223	30799	27723

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				Step 6	Estimation of Energy consumption per sqm for the month n_PJ											
				4.93	4.87	5.54	6.56	6.64	6.23	6.56	6.07	5.83	6.06	5.13	4.95	
	Name of Station	Station	Active	January	February	March	April	May	June	July	August	September	October	November	December	
1	Adarsh Nagar	AHNR	7187	3.97	3.50	4.04	4.44	4.52	4.17	4.46	4.78	4.35	4.43	4.08	4.08	
2	Anand vihar ISBT	AVIT	9880	2.11	2.97	2.69	2.46	2.64	6.85	4.00	4.03	5.74	5.24	4.57	2.40	
3	Arjangarh	ARJ	10974	1.94	1.93	1.97	2.35	2.49	2.35	2.52	2.52	2.52	2.39	2.02	1.81	
4	Azadpur	AZU	8421	3.98	3.31	3.93	4.05	4.37	4.29	4.21	4.30	4.11	4.21	4.06	3.92	
5	Botanical Garden	BCGN	6815	5.00	5.90	5.58	4.89	4.94	5.44	5.76	5.66	5.40	4.17	3.72	3.51	
6	Dwarka Sector- 8	DSET	5133	3.90	3.90	5.84	5.84	5.84	5.84	5.84	5.84	4.66	4.75	4.72	4.83	
7	Ghittorni	GHTI	10961	2.94	2.64	3.08	3.05	3.39	3.15	3.07	3.17	2.84	3.26	2.94	2.85	
8	Golf Course	GEC	7044	4.70	4.76	4.63	4.54	4.49	4.51	4.47	4.41	6.85	6.77	5.97	5.85	
9	Govindpuri	GDPI	8015	3.92	3.87	4.85	4.95	5.11	4.90	4.82	4.89	4.94	4.98	4.67	4.58	
10	Guru Dronacharya	GE	11198	4.13	3.84	4.43	4.31	4.69	4.36	4.47	4.43	4.43	4.35	4.09	4.11	
11	Huda city Centre	HCC	10689	2.54	2.48	3.04	3.34	3.71	3.53	3.30	3.29	3.26	3.10	2.83	2.68	
12	Iffco Chowk	IFFCO	11145	3.19	2.95	3.46	3.44	3.83	3.49	3.48	3.48	3.42	3.30	3.31	3.21	
13	Jasola Apollo	JLA	12863	2.17	2.21	3.15	3.14	3.61	3.33	3.29	3.32	3.29	2.97	2.73	2.70	
14	Jhilmil	JLML	8148	3.76	3.36	4.14	4.84	5.00	4.74	4.59	4.79	4.70	4.58	4.14	4.24	
15	Kalkaji	KJMD	9165	3.21	3.46	3.86	3.96	4.22	3.98	3.84	3.89	3.81	3.80	3.71	3.55	
16	Karkardooma	KKDA	14346	4.60	2.22	2.07	1.75	2.30	2.14	2.23	1.95	2.88	2.30	2.18	2.05	
17	Lajpat Nagar	LPN	9218	4.27	4.07	3.45	4.40	4.38	4.32	4.25	4.46	4.60	4.55	4.60	3.95	
18	Mansarovar Park	MPK	8149	3.58	3.03	3.53	4.36	4.44	4.66	4.59	5.16	4.50	4.63	4.04	4.03	
19	Mayur vihar extension	MVPE	8485	3.13	2.11	3.30	3.36	3.36	3.36	3.42	3.37	2.96	2.45	2.61	2.41	
20	Mayur Vihar Phase I	MVP1	8485	3.54	3.54	3.01	3.26	3.53	2.72	4.07	4.03	4.01	4.01	4.02	4.01	
21	MG road	MGRO	12157	3.20	2.94	3.23	3.49	3.78	3.55	3.54	3.66	3.63	3.50	3.40	3.51	
22	Model Town	MDTW	7187	2.80	2.50	2.86	3.38	3.68	3.47	3.49	3.71	3.92	3.29	2.80	2.58	
23	Mohan estate	METE	8256	2.26	3.82	4.35	4.09	4.70	4.68	4.57	4.46	4.35	4.11	3.95	3.62	
24	Moolchand	MLCD	9128	3.67	3.24	3.66	3.61	4.23	4.47	4.47	4.52	4.27	3.96	3.58	3.54	
25	Nehru Place	NP	9884	4.42	4.24	4.92	5.14	5.66	4.56	4.06	3.60	3.88	3.68	4.35	4.48	
26	Noida city Centre	NCC	6230	2.90	5.38	5.23	5.13	7.18	4.90	5.60	4.92	6.18	5.84	5.21	5.16	
27	Noida sec eighteen	NSET	6121	2.72	2.74	2.89	3.05	3.77	3.57	3.64	3.57	5.59	4.63	4.61	4.63	
28	Noida Sec Fiftn	NSFT	6272	2.73	2.59	3.25	3.56	4.15	3.40	3.61	3.57	3.72	3.20	3.37	3.07	
29	Noida Sec sixteen	NSST	6256	3.22	2.88	3.46	3.74	4.51	4.30	4.34	4.40	4.89	5.90	6.05	4.34	
30	Qutab Minar	QM	10139	3.95	3.71	4.29	4.44	5.01	4.85	4.86	4.87	4.82	4.85	4.58	4.61	
31	Sarita Vihar	STVR	7612	4.28	4.25	4.78	4.08	5.46	6.36	6.38	5.49	5.58	4.62	4.84	4.63	
32	MARG	SRSM	5228	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.92	4.91	4.39	4.32	
33	SHIVAJI PARK	SHVP	9005	4.08	3.70	4.15	4.07	4.54	4.35	4.25	4.30	4.18	3.92	3.64	3.73	
34	Sikanderpur	SKRP	11215	2.69	2.94	2.84	4.05	3.25	3.65	3.77	3.74	3.88	3.80	3.41	3.62	
35	Sultanpur	SLTP	14936	2.98	2.87	3.45	3.59	3.87	3.57	3.77	3.83	3.81	3.80	3.56	3.60	
36	Tughlakabad	TKBD	12933	0.31	2.53	3.02	3.14	3.52	3.74	3.53	3.49	3.33	2.92	2.54	2.46	
37	Yamuna Bank	YB	10000	3.86	3.61	4.70	4.03	4.29	4.91	4.76	4.63	3.25	3.32	3.08	2.77	

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Step 4 Estimation of Energy efficiency factor for eah station in the given month $\eta_{BL} - \eta_{PJ}$ for 2011															
	Name of Station	Station Code	Active Builtup Area (in Sq.m)	January	February	March	April	May	June	July	August	September	October	November	December
1	Adarsh Nagar	AHNR	7187	1.13	1.71	1.63	2.28	2.00	1.76	2.10	1.66	1.65	1.64	1.16	0.98
2	Anand vihar ISBT	AVIT	9880	2.80	-0.22	-0.63	0.71	3.52	5.14	5.58	2.59	2.65	3.30	2.35	2.17
3	Arjangarh	ARJ	10974	0.00	0.00	0.00	0.00	0.00	0.00	4.07	3.48	3.49	3.75	3.21	2.87
4	Azadpur	AZU	8421	1.49	1.66	1.82	2.39	2.30	2.02	2.74	2.17	1.93	1.91	1.49	1.09
5	Botanical Garden	BCGN	6815	1.13	1.43	1.77	0.42	0.60	0.54	3.06	1.55	0.91	2.05	1.04	2.38
6	Dwarka Sector- 8	DSET	5133	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.05
7	Ghittorni	GHTI	10961	0.00	0.00	0.00	0.00	0.00	0.00	3.44	2.89	2.64	2.90	2.26	2.01
8	Golf Course	GEC	7044	1.19	1.54	1.88	2.42	1.50	1.26	1.58	1.12	1.30	1.51	0.53	0.25
9	Govindpuri	GDPI	8015	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.41	1.38	0.73
10	Guru Dronacharya	GE	11198	0.00	0.00	0.00	0.00	0.00	0.00	2.09	2.03	1.68	1.63	1.08	0.71
11	Huda city Centre	HCC	10689	0.00	0.00	0.00	0.00	0.00	0.00	1.21	3.43	2.18	2.40	1.88	2.05
12	Iffco Chowk	IFFCO	11145	0.00	0.00	0.00	0.00	0.00	0.00	2.83	2.46	2.11	2.53	1.51	1.54
13	Jasola Apollo	JLA	12863	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.16	2.73	2.71
14	Jhilmil	JLML	8148	1.15	1.49	1.03	1.31	1.59	1.39	1.87	1.32	1.31	1.28	1.31	1.21
15	Kalkaji	KJMD	9165	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.74	1.93	1.59
16	Karkardooma	KKDA	14346	3.45	2.66	3.29	4.11	4.08	3.76	3.45	2.99	1.83	2.23	1.49	0.82
17	Lajpat Nagar	LJPN	9218	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.84	0.58	0.47
18	Mansarovar Park	MPK	8149	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	Mayur vihar extension	MVPE	8485	1.83	2.08	2.44	3.35	3.23	3.02	3.84	3.36	3.48	3.73	3.23	2.92
20	Mayur Vihar Phase I	MVP1	8485	1.83	2.12	2.50	2.65	2.46	2.29	3.06	3.73	2.64	3.31	1.91	2.80
21	MG road	MGRO	12157	0.00	0.00	0.00	0.00	0.00	0.00	3.13	2.74	2.45	2.65	1.95	1.62
22	Model Town	MDTW	7187	1.81	1.72	1.71	2.55	2.95	2.14	2.93	2.92	2.52	2.16	1.92	1.98
23	Mohan estate	METE	8256	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	Moolchand	MLCD	9128	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.39	1.82	1.46
25	Nehru Place	NP	9884	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.41	0.70	0.53
26	Noida City Centre	NCC	6230	0.74	-0.27	-1.03	0.01	0.46	0.15	0.09	-0.11	-0.31	0.35	0.41	1.11
27	Noida sec eighteen	NSET	6121	0.63	1.06	1.38	2.89	2.66	2.66	2.70	2.63	2.49	2.95	1.87	2.03
28	Noida Sec Fiftn	NSFT	6272	0.85	1.16	1.47	2.81	2.66	2.18	2.62	2.73	2.46	3.09	2.25	2.21
29	Noida Sec sixteen	NSST	6256	0.72	1.11	1.42	2.22	2.10	1.82	2.18	2.30	1.74	2.20	1.47	1.74
30	Qutab Minar	QM	10139	0.00	0.00	0.00	0.00	0.00	0.00	1.80	1.47	1.43	1.51	1.09	0.84
31	Sarita Vihar	STVR	7612	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.64	1.13	0.69
32	SATGURU RAMSINGH MARG	SRSM	5228	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	SHIVAJI PARK	SHVP	9005	0.00	0.00	0.00	0.00	3.62	1.64	2.12	1.67	1.74	2.14	1.32	0.97
34	Sikanderpur	SKRP	11215	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.75	2.62	3.00	2.30	2.17
35	Sultanpur	SLTP	14936	0.00	0.00	0.00	0.00	0.00	0.00	3.28	2.80	2.79	2.98	2.24	2.07
36	Tughlakabad	TKBD	12933	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37	Yamuna Bank	YB	10000	0.19	1.64	1.23	1.78	1.74	1.24	4.01	1.36	1.39	1.45	1.25	1.03

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				Step 4	Estimation of Energy efficiency factor for eah station in the given month $\eta_{BL} - \eta_{PJ}$ for 2011											
	Name of Station	Station	Active	January	February	March	April	May	June	July	August	September	October	November	December	
1	Adarsh Nagar	AHNR	7187	0.97	1.37	1.50	2.12	2.12	2.06	2.10	1.29	1.47	1.63	1.05	0.87	
2	Anand vihar ISBT	AVIT	9880	2.82	1.90	2.85	4.11	4.00	-0.63	2.56	2.04	0.08	0.82	0.55	2.55	
3	Arjangarh	ARJ	10974	2.99	2.94	3.57	4.22	4.15	3.88	4.03	3.55	3.31	3.67	3.11	3.14	
4	Azadpur	AZU	8421	0.96	1.57	1.61	2.51	2.27	1.94	2.35	1.77	1.71	1.85	1.07	1.03	
5	Botanical Garden	BCGN	6815	-0.06	-1.03	-0.04	1.67	1.70	0.79	0.79	0.41	0.43	1.89	1.40	1.44	
6	Dwarka Sector- 8	DSET	5133	1.04	0.98	-0.30	0.72	0.79	0.38	0.71	0.22	1.17	1.31	0.41	0.12	
7	Ghittorni	GHTI	10961	2.00	2.24	2.46	3.51	3.25	3.08	3.49	2.90	2.99	2.80	2.18	2.10	
8	Golf Course	GEC	7044	0.23	0.11	0.91	2.03	2.15	1.72	2.08	1.66	-1.03	-0.71	-0.84	-0.90	
9	Govindpuri	GDPI	8015	1.02	1.00	0.69	1.61	1.53	1.33	1.73	1.17	0.89	1.08	0.46	0.36	
10	Guru Dronacharya	GE	11198	0.81	1.04	1.11	2.25	1.95	1.87	2.09	1.64	1.40	1.71	1.04	0.84	
11	Huda city Centre	HCC	10689	2.39	2.39	2.50	3.23	2.93	2.70	3.26	2.78	2.56	2.97	2.30	2.27	
12	Iffco Chowk	IFFCO	11145	1.74	1.92	2.08	3.12	2.80	2.74	3.08	2.59	2.40	2.76	1.82	1.74	
13	Jasola Apollo	JLA	12863	2.76	2.66	2.39	3.43	3.03	2.90	3.26	2.75	2.54	3.09	2.40	2.25	
14	Jhilmil	JLML	8148	1.17	1.51	1.41	1.73	1.63	1.49	1.96	1.28	1.13	1.48	0.99	0.71	
15	Kalkaji	KJMD	9165	1.72	1.41	1.68	2.60	2.42	2.25	2.71	2.18	2.02	2.26	1.41	1.40	
16	Karkardooma	KKDA	14346	0.34	2.65	3.48	4.81	4.33	4.09	4.32	4.12	2.95	3.76	2.95	2.89	
17	Lajpat Nagar	LPN	9218	0.66	0.80	2.09	2.17	2.25	1.91	2.30	1.61	1.22	1.51	0.52	1.00	
18	Mansarovar Park	MPK	8149	1.36	1.84	2.01	2.21	2.20	1.57	1.97	0.91	1.32	1.43	1.08	0.92	
19	Mayur vihar extension	MVPE	8485	1.81	2.76	2.24	3.20	3.27	2.87	3.14	2.69	2.87	3.61	2.51	2.54	
20	Mayur Vihar Phase I	MVP1	8485	1.40	1.34	2.53	3.30	3.11	3.51	2.49	2.04	1.82	2.06	1.10	0.94	
21	MG road	MGRO	12157	1.73	1.93	2.31	3.07	2.86	2.68	3.02	2.41	2.20	2.56	1.73	1.44	
22	Model Town	MDTW	7187	2.13	2.37	2.68	3.18	2.96	2.76	3.07	2.36	1.91	2.77	2.33	2.37	
23	Mohan estate	METE	8256	2.68	1.05	1.19	2.47	1.94	1.55	1.99	1.61	1.47	1.95	1.17	1.33	
24	Moolchand	MLCD	9128	1.26	1.63	1.88	2.95	2.40	1.76	2.09	1.55	1.56	2.10	1.54	1.41	
25	Nehru Place	NP	9884	0.51	0.64	0.62	1.42	0.98	1.67	2.50	2.47	1.94	2.38	0.77	0.47	
26	Noida city Centre	NCC	6230	2.03	-0.51	0.31	1.44	-0.54	1.33	0.96	1.15	-0.36	0.22	-0.08	-0.21	
27	Noida sec eighteen	NSET	6121	2.22	2.13	2.65	3.51	2.87	2.65	2.92	2.50	0.24	1.43	0.51	0.31	
28	Noida Sec Fiftn	NSFT	6272	2.20	2.28	2.29	3.01	2.49	2.83	2.95	2.50	2.10	2.87	1.76	1.88	
29	Noida Sec sixteen	NSST	6256	1.71	1.99	2.08	2.83	2.13	1.93	2.22	1.67	0.93	0.16	-0.92	0.61	
30	Qutab Minar	QM	10139	0.98	1.16	1.25	2.13	1.62	1.38	1.70	1.20	1.01	1.21	0.54	0.34	
31	Sarita Vihar	STVR	7612	0.66	0.62	0.76	2.48	1.18	-0.14	0.18	0.58	0.24	1.44	0.29	0.31	
32	MARG	SRSM	5228	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91	1.16	0.73	0.63	
33	SHIVAJI PARK	SHVP	9005	0.86	1.17	1.39	2.50	2.09	1.88	2.31	1.77	1.65	2.14	1.49	1.21	
34	Sikanderpur	SKRP	11215	2.24	1.94	2.70	2.52	3.39	2.58	2.79	2.33	1.95	2.26	1.71	1.33	
35	Sultanpur	SLTP	14936	1.96	2.01	2.09	2.98	2.76	2.66	2.79	2.24	2.02	2.26	1.57	1.35	
36	Tughlakabad	TKBD	12933	4.62	2.35	2.52	3.42	3.12	2.49	3.03	2.58	2.49	3.14	2.58	2.49	
37	Yamuna Bank	YB	10000	1.07	1.27	0.84	2.53	2.35	1.32	1.79	1.44	2.58	2.74	2.05	2.18	

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Step 3 Energy Savings in Kwh ES_{kwh}															
	Name of Station	Station Code	Active Building Area (in Sq.m)	January	February	March	April	May	June	July	August	September	October	November	December
1	Aakash Nagar	ANNR	7187	8133	12276	11701	36378	34379	12681	15102	13906	11837	11791	8333	7068
2	Anand Vilas ESSE	AVVT	9880	27639	-2160	-6228	7031	34730	50767	55084	25595	26208	32563	23231	21482
3	Anjanpur	AN	10974	0	0	0	0	0	0	44704	38168	38333	41121	35237	31464
4	Azalpur	AZU	8421	12585	13952	15307	20131	35366	17025	23109	18304	16210	16300	12508	9217
5	Botanical Garden	BGM	6885	7733	9770	12035	2851	4069	3704	20825	10569	6218	13891	7090	16191
6	Daruka Sector-B	DSET	5333	0	0	0	0	0	0	0	0	0	0	0	5402
7	Chittori	CHTI	10961	0	0	0	0	0	0	37686	31728	28974	31792	24741	21980
8	Golf Course	GEC	7084	8405	10880	33275	17047	30540	8881	11106	7884	9364	10613	3711	1786
9	Govinipuri	GDFI	8085	0	0	0	0	0	0	0	0	0	27350	11030	5844
10	Gum Damschanya	GE	11198	0	0	0	0	0	0	23387	22689	18785	18301	12049	7985
11	Hula City Centre	HCC	10589	0	0	0	0	0	0	12899	36624	23329	25604	20138	21935
12	Hiko Churek	HFCO	11145	0	0	0	0	0	0	31494	27427	23466	28399	16864	17162
13	Jasola Apollo	JIA	12863	0	0	0	0	0	0	0	0	0	40585	35300	34799
14	Jhilmil	JHML	8448.36	9399	12176	8355	30637	12955	11330	15216	10750	10657	10401	10636	9851
15	Kallaji	KJMD	9164.8	0	0	0	0	0	0	0	0	0	25352	17689	14565
16	Kankar Damsa	KDDA	14346	49535	38094	47230	58958	56584	53932	49530	42961	26273	31933	21386	11726
17	Lajpat Nagar	LJPN	9218	0	0	0	0	0	0	0	0	0	16960	5333	4370
18	Mansarovar Park	MPPK	8449	0	0	0	0	0	0	0	0	0	0	0	0
19	Mayapuri extension	MNPE	8485	15535	17681	20668	28442	27438	25633	32587	28475	29518	31663	27441	24744
20	Mayapuri Phase I	MNPI	8485	15535	17975	21183	22497	20874	19464	23860	31611	22384	28104	16366	23790
21	MCC road	MCRD	12157	0	0	0	0	0	0	38005	33339	29832	32203	23749	19704
22	Model Town	MDTW	7187	12980	12367	12290	38341	21197	15348	21027	21019	18342	15504	13773	14247
23	Moham estate	MEET	8256	0	0	0	0	0	0	0	0	0	0	0	0
24	Miraflood	MFCO	9128	0	0	0	0	0	0	0	0	0	21793	16572	13286
25	Nehru Place	NPP	9884	0	0	0	0	0	0	0	0	0	23811	6921	5189
26	Noida City Centre	NCC	6230	4584	-1639	-6427	62	2896	909	542	-708	-1945	2357	2548	6806
27	Noida Sec eighteen	NSET	6321	3851	6498	8417	17673	16282	16282	16554	16126	15248	18087	11427	12339
28	Noida Sec Fifteen	NSEF	6272	5300	7287	9251	17616	16711	13702	16428	17142	15447	19400	14032	13876
29	Noida Sec sixteen	NSSF	6256	4517	6940	8932	13914	13142	13376	13660	14899	10904	13792	9222	10909
30	Opeta Minar	OM	10139	0	0	0	0	0	0	18273	14950	14534	15289	11004	8487
31	Sarita Vilas	SVVR	7682	0	0	0	0	0	0	0	0	0	27706	8582	5261
32	SATGURU RAMSINGH II MARG	SRSM	5228	0	0	0	0	0	0	0	0	0	0	0	0
33	SHIKHARI PARK	SHVP	9025	0	0	0	0	32555	14780	19083	15134	15685	19257	11915	8738
34	Sikandarpur	SKPP	11215	0	0	0	0	0	0	0	30862	29344	33631	25756	24333
35	Sultanpur	SLTP	14936	0	0	0	0	0	0	48971	43884	41644	44406	33485	30970
36	Tughlakabad	TMD	12933	0	0	0	0	0	0	0	0	0	0	0	0
37	Yamuna Bank	YB	10000	1872	16407	12316	17830	17373	12401	40139	13593	13889	14529	12511	10334
Total				187562	178486	188287	269407	323093	288217	631373	562328	494082	743877	510189	475960
Energy Savings in MWh ES_{mwh}				188	178	188	269	323	288	631	562	494	744	510	476

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				Step 3	Energy Savings in Kwh											
	Name of Station	Station	Active	January	February	March	April	May	June	July	August	September	October	November	December	
1	Aakash Nagar	AHNR	7187	6951	9833	10772	15247	15201	14795	15085	9279	10588	11715	7547	6286	
2	Anand vilkar ISBT	AVIT	9888	27873	18796	28144	40563	39506	-6178	25295	20139	835	8077	5464	25167	
3	Arjanagarh	ARJ	18974	32853	32282	39147	46293	45495	42611	44268	38942	36329	40295	34127	34462	
4	Azadpur	AZU	9421	8053	13182	13563	21170	19079	16336	19768	14882	14441	15555	9013	8648	
5	Botanical Garden	BGDN	6815	-430	-7018	-288	11415	11556	5353	5404	2798	2899	12894	9547	9789	
6	Dwarika Sector- 2	DSET	5133	5328	5011	-1555	3693	4072	1976	3680	1153	6005	6736	2081	591	
7	Ghitorni	GHTI	10961	21909	24504	27013	38521	35625	33723	38230	31780	32757	30655	23911	23003	
8	Golf Course	GEC	7044	1654	781	6427	14285	15140	12083	14681	11683	-7236	-5014	-5927	-6318	
9	Govindpuri	GDP1	8815	8161	8000	5501	12899	12230	10686	13884	9413	7111	8634	3681	2914	
10	Guru Dronacharya	GE	11198	9042	11596	12402	25219	21856	20943	23361	18362	15686	19200	11648	9367	
11	Huda city Centre	HCC	18889	25592	25646	26735	34489	31297	28824	34854	29741	27383	31686	24589	24264	
12	Iffco Chowk	IFFCO	11145	19448	21402	23195	34796	31252	30539	34326	28842	26791	30799	20284	19363	
13	Jasola Apollo	JA	12863	35494	34262	30723	44067	38921	37258	41982	35408	32610	39781	30829	28922	
14	Jail road	JMR	8148	9526	12322	11448	14074	13305	12151	16005	10459	9176	12082	8028	5747	
15	Kalkaji	KARD	9165	15771	12961	15425	23869	22164	20617	24858	19975	18511	20690	12955	12844	
16	Karlanwasa	KDA	14946	4830	38052	49856	68993	62164	58614	62041	59059	42308	53914	42308	41524	
17	Lajpat Nagar	LPN	9218	6112	7363	19258	19976	20772	17588	21233	14860	11262	13920	4827	9220	
18	Mansarovar Park	MPE	8149	11052	15018	16418	17983	17905	12756	16060	7387	10785	11676	8839	7465	
19	Mayapuri extension	MVPE	9485	15316	23436	19009	27162	27778	24357	26653	22861	24312	30622	21325	21548	
20	Mayapuri Phase I	MVP1	9485	11865	11341	21494	28025	26362	29767	21134	17275	15448	17446	9348	8000	
21	MG road	MGRD	12157	21048	23436	28117	37324	34792	32526	36701	29291	26728	31168	21080	17469	
22	Mohali Town	MOTW	7187	15332	17046	19277	22866	21246	19840	22042	16977	13725	19904	16748	17022	
23	Mohali estate	METE	8256	22113	8671	9822	20395	15977	12785	16416	13275	12166	16138	9685	11007	
24	Moolchand	MUCD	9128	11523	14914	17165	26971	21931	16083	19056	14151	14246	19202	14083	12843	
25	Nehru Place	NP	9884	5078	6287	6144	14050	9678	16506	24703	24385	19219	23550	7651	4633	
26	Noida city Centre	NCC	6298	12647	-3186	1915	8940	-3374	8301	5992	7171	-2219	1352	-516	-1310	
27	Noida sec eight es	NSET	6121	13565	13068	16211	21478	17552	16247	17871	15299	1442	8765	3152	1925	
28	Noida Sec Fifth	NSFT	6272	13828	14320	14383	18867	15598	17763	18479	15682	13196	17976	11017	11766	
29	Noida Sec sixth es	NSST	6256	10703	12466	13021	17689	13309	12088	13892	10470	5839	995	-5769	3800	
30	Qutab Minar	QM	18139	9969	11805	12677	21566	16473	13978	17217	12201	10231	12312	5504	3428	
31	Sarita Vihar	SVVR	7612	5005	4714	5775	18905	8961	-1083	1369	4382	1858	10984	2184	2388	
32	MANG	SRSM	5228	0	0	0	0	0	0	0	0	0	4762	6045	3837	3310
33	SHIVAN PARK	SHVP	9885	7726	10542	12547	22494	18861	16888	20782	15919	14848	19293	13376	10936	
34	Sikanderpur	SOP	11215	25164	21701	30293	28212	37965	28969	31297	26147	21831	25343	19184	14951	
35	Sulazpur	SLTP	14886	29255	29969	31184	44458	41295	39785	41604	33383	30165	33775	23400	20209	
36	Tughlakabad	TMOB	12983	58754	30839	32565	44264	40809	32219	39172	33364	32224	40576	33382	32230	
37	Yamuna Bank	YB	18880	10745	12656	8445	25328	23622	13158	17929	14383	25813	27383	20456	21761	
	Total			549856	547419	634230	936543	845776	720915	847316	690786	584077	726143	482839	481136	
	Energy Savings in MWh			550	547	634	937	846	721	847	691	584	726	483	481	

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This project uses fixed ex-ante combined margin emission factor calculations for northern grid published by the CEA of India. For details please refer –

http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

1. Baseline Carbon Dioxide Emission Database Version 7.0 – LATEST
2. User Guide – Version 7.0 - LATEST

Weighted Average Emission Rate (tCO₂/MWh) (incl. Imports) (2)					
	2006-07	2007-08	2008-09	2009-10	2010-11
NEWNE	0.82	0.81	0.83	0.82	0.80
South	0.72	0.72	0.76	0.75	0.75
India	0.80	0.79	0.81	0.81	0.79
Simple Operating Margin (tCO₂/MWh) (incl. Imports) (1) (2)					
	2006-07	2007-08	2008-09	2009-10	2010-11
NEWNE	1.01	1.00	1.01	0.98	0.97
South	1.00	0.99	0.97	0.94	0.94
India	1.01	1.00	1.00	0.97	0.96
Build Margin (tCO₂/MWh) (not adjusted for imports)					
	2006-07	2007-08	2008-09	2009-10	2010-11
NEWNE	0.63	0.60	0.68	0.81	0.86
South	0.70	0.71	0.82	0.76	0.73
India	0.65	0.63	0.71	0.80	0.83
Combined Margin in tCO₂/MWh (incl. Imports) (1) (2)					
	2006-07	2007-08	2008-09	2009-10	2010-11
NEWNE	0.82	0.80	0.84	0.90	0.91
South	0.85	0.85	0.90	0.85	0.84
India	0.83	0.81	0.85	0.88	0.90
