CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

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Title: Reducing the Average Clinker Content in Cement at CEMEX Mexico Operations.
Version 01
Date: 05/01/2007

A.2. Description of the project activity:

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CEMEX S.A. de C.V. (CEMEX) is an international cement producer originated in Monterrey, Mexico. CEMEX S.A. de C.V. has fifteen cement plants in Mexico, and an installed capacity of 27.2 Million Tonnes per annum.
The project activity consists in the reduction of the average clinker content in the cement of resistance Class 30R (30 N/mm2 after 28d) produced CEMEX Mexico Operations. The average clinker percentage is expected to decrease from 78,4%, in the base year, to over 72,3% in the crediting period.

Clinker is the most important material for cement production. Clinker manufacturing includes:

1. Pre-processing (grinding and crushing)
2. Pyro-processing of the raw meal

The clinker manufacturing process is an energy intensive process. The project activity aims to optimally utilize the clinker in Portland Pozzolan Cement (PPC) and Compound Portland Cement (PCC) Class 30R (Class 30R is defined by the Mexican standard NMX C-414 ONNCCE 2004). The clinker percentage reduction by adding various additive materials such as pozzolan, limestone, fly ash, slag … would conserve natural resources such as fossil fuels and diminish the burning of fossil fuels from which temperature and electricity are obtained for cement manufacture. The project activity would therefore diminish GHG emissions from clinker production such as from a reduced consumption of electricity per unit of cement produced.

The project activity contributes to sustainable development at the local, regional and global levels in the following ways:

Environmental sustainability:

- GHG emissions reduction: Clinker production from raw material is the main source of CO2 emissions during cement production. The project activity consists in the reduction of clinker percentage in cement production, resulting in GHG emission reductions.

- Thermal and electrical energy conservation: The project activity reduces specific thermal and electrical energy consumption for cement production.

- Industrial waste utilization: Fly ash is an industrial waste from power plants. Fly ash disposal is a major environmental problem of coal based thermal power plants. The project activity facilitates fly ash utilization and disposal on the part of coal fired thermal power plants. Slag is an industrial waste from steel industry. This waste would be disposed in a sustainable manner in cement plants. The project indirectly encourages the development of waste management infrastructure.

- Other harmful emissions such as NO_x and SO_x are reduced by the project activity.

- Resource conservation. The project activity preserves resources in the following way:
    - Reduction in the quantity of limestone required for cement production.
    - Reduction of fossil fuels used for cement production.

  This resource conservation promotes sustainable development by the ways of
    - Reduction in quarry mining for limestone extraction.
    - Reduction of associated fugitive dust emissions.
    - Reduction of land destruction and erosions arising from such activities.
    - Reduction in adverse health impacts caused from quarrying of materials on nearby habitats and ecosystem.

Economic sustainability:

The project would create new employment opportunities as more labor is required for preparing and transporting the additive materials.

Social sustainability:

Throughout the local stakeholder consultation process, no negative responses were received; thereby the project would not create any conflicts with local community.

A.3. Project participants:

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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)**
Govt. of Mexico	CEMEX Mexico, S.A. de C.V.	No

Table 1. Project participants

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

>>
Mexico.

A.4.1.2. Region/State/Province etc.:

>>
Various (See detailed list in A.4.1.4.).

A.4.1.3. City/Town/Community etc:

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Various (See detailed list in A.4.1.4.).

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

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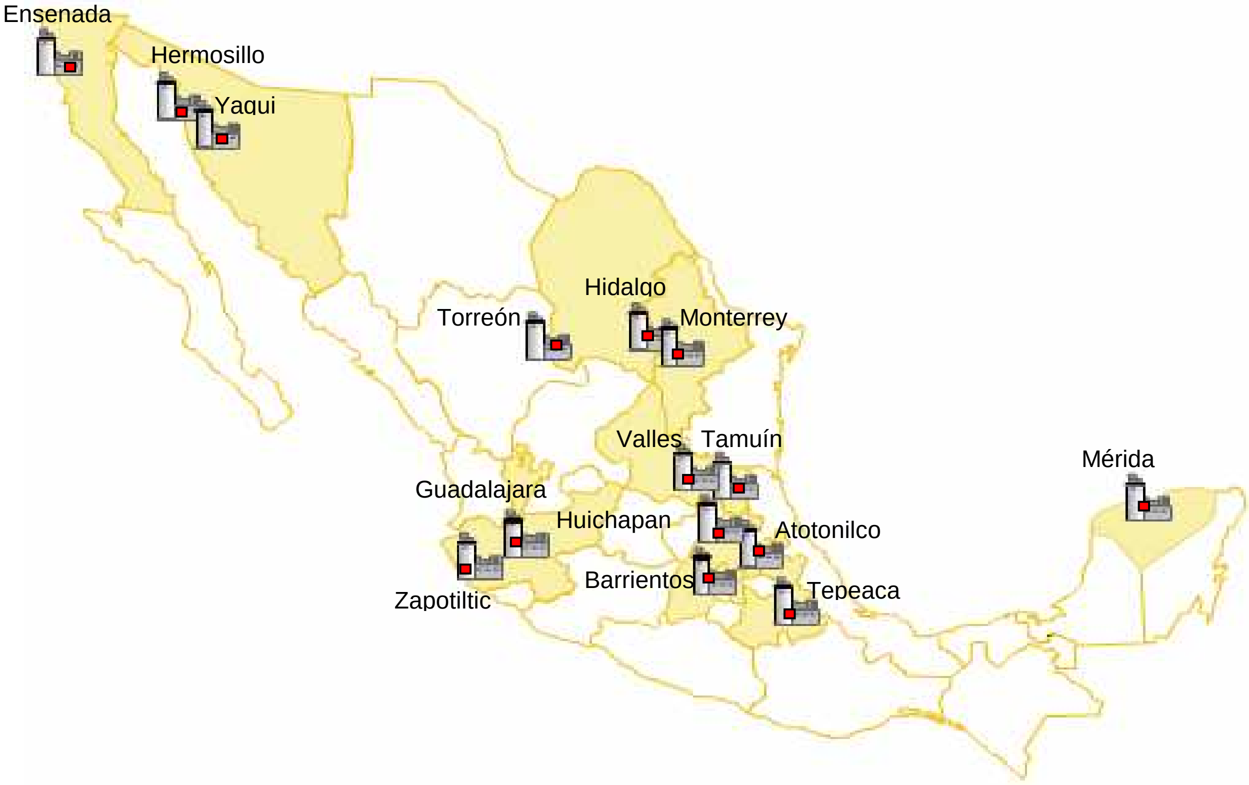
The location of the CEMEX Mexico's plants is detailed as follows:

Plant Name	State	Address
Planta Atotonilco	Hidalgo	Barrio Boxfi s/n Tolteca 42980 Atotonilco de Tula
Planta Barrientos	Mexico (State)	Vía Gustavo Baz No. 4500 San Pedro Barrientos 54110 Tlalnepantla
Planta Campana	Sonora	Carr. Hermosillo-Sahuarida km. 23.5 83000 Hermosillo
Planta Ensenada	Baja California	Arroyo El Gallo s/n Col. Carlos Pacheco 22890 Ensenada
Planta Guadalajara	Jalisco	Gobernador Curiel No. 5300 Las Juntas 44940 Guadalajara
Planta Hidalgo	Nuevo León	Galeana No. 300 Sur Centro 65600 Hidalgo
Planta Huichapan	Hidalgo	Rancho La Sala, Ejido el Maney 42400 Huichapan
Planta Mérida	Yucatán	Carr. Mérida-Umán km. 6 Ciudad Industrial 97178 Mérida,
Planta Monterrey	Nuevo León	Av. Independencia No. 901-A Ote. Col. Cementos 64520 Monterrey
Planta Tamuín	San Luis Potosí	Fracc. Estación Las Palmas s/n 79200 Tamuín
Planta Tepeaca	Puebla	Ex-Hacienda San Lorenzo s/n 75220 Cuautinchán
Planta Torreón	Coahuila	Carr. 30 km. 3.5 Fracc. Loreto 27000 Torreón
Planta Valles	San Luis Potosí	Carr. Valles-Tampico km. 5.5 79000 Ciudad Valles
Planta Yaqui	Sonora	Carr. A La Colorada km. 17.5 Sucursal Nuevo Hermosillo Apartado Postal 50-2 85540 Hermosillo
Planta Zapotiltic	Jalisco	Carr. Zapotiltic-Tamazula km. 4.5 49600 Zapotiltic, El Mirador

Table 2. Plants' information.



A.4.2. Category (ies) of project activity:

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The project is a cement sector project activity and may principally be categorized in the scope 4: Manufacturing Industries.

A.4.3. Technology to be employed by the project activity:

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The following Figure shortly depicts the cement production process for ordinary portland cement. The necessary measures to increase the amount of additions can be roughly divided into two groups:

- **Clinker and cement quality:** better process control, changes in clinker composition, use of active agents in the formation of, regular microscope analysis of clinker, use of chemical additives in cement manufacture, finer grinding.
- **Logistics**:
  - Additional storage facilities,
  - Scales,
  - Dosage systems,
  - Mechanical separators of cement.

In order to maintain actual clinker quality, improved clinker quality is needed and the grinding process requires more stringent control. As a consequence, this project must be supported by further efforts including additional equipment and installations as well as research and development (R&D).

Additional equipment and installations:

The equipment that will be required for the project implementation is mainly for metering, milling, grinding, packages and crushing, as well as the additional equipment necessary for laboratory tests, such as microscopes and specialized devices to overcome the barriers detailed in Section B.5.

On other hand equipment for identify, meter and control the chemical additives, will be required.

Internal training:

Internal training is required to ensure a successful introduction of new cement type with less clinker percentage. This training effort addresses production, testing, quality control and marketing aspects.

A.4.4 Estimated amount of emission reductions over the chosen crediting period:

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A fixed crediting period formula starting in January 1, 2008, has been selected, with an overall CO_2 emission reduction expected of 2.863.338 tCO_2 for CEMEX Mexico Operations.

Year	**Annual estimation of emission reductions in tonnes of CO2 e**
2008	249.492
2009	345.560
2010	436.111
2011	420.244
2012	374.924
2013	324.612
2014	270.320
2015	211.829
2016	148.913
2017	81.333
Total estimated reductions (tonnes of CO2 e)	2.863.338
Total number of crediting years	10 Years
Annual average of estimated reductions over the crediting period (tonnes of CO2 e)	286.334

Table 3. Emission reductions

A.4.5. Public funding of the project activity:

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No public funding is used for this project activity.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

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For the project activity, the approved baseline methodology used is ACM0005 Version 03, consolidated baseline methodology for *“increasing the Blend in cement production”*.

B.2 Justification of the choice of the methodology and why it is applicable to the project activity:

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This methodology is applicable to the projects to increase the share of additives (thus reducing the percentage of clinker) in cement production. The share of additives will be increased in CEMEX Mexico’s plants.

CEMEX Mexico project activity fulfils all the applicability conditions of the consolidated baseline methodology for “*increasing the Blend in cement production*”.

- There is no shortage of additives related to the lack of blending materials. Project participants should demonstrate that there is no alternative allocation or use for additional amount of additives used in the project activity. If the surplus availability of additives is not substantiated the project emissions reductions (ERs) will be discounted as outlined below.

The additives (limestone, pozzolan, fly ash and slag) are available in abundance in the different project activity regions.

- This methodology is applicable to domestically sold output of the project activity plant and excludes export of blended cement.

All exported project activity output of the will not generate emission reductions. CEMEX Mexico expects to sell 12.3 Million of tonnes of PCC and PPC (Class 30R) per annum in the domestic market.

- Adequate data is available on cement types in the market.

Adequate data on cement type in the market is available. Adequate market data are provided by CANACEM (Cement National Chamber).

Therefore the project activity fulfils the applicability conditions specified in the methodology.

This baseline methodology shall be used in conjunction with the approved monitoring methodology ACM0005 (“Consolidated Monitoring Methodology for Increasing the Blend Cement Production”).

B.3. Description of the sources and gases included in the project boundary

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Only CO_2 is included in the project boundary. In line with methodology, changes in CH_4, and N_2O emissions are negligible.

	Source	Gas	Included?	Justification / Explanation
Baseline Emission	Limestone calcinations for clinker production.	CO_2	Yes	
		CH_4	No	Negligible.
		N_2O	No	Negligible.
	Fossil fuel consumption for clinker production	CO_2	Yes	
		CH_4	No	Negligible.
		N_2O	No	Negligible.
	Emissions from grid electricity for clinker production	CO_2	Yes	
		CH_4	No	Negligible.
		N_2O	No	Negligible.
Project Activity Emissions	Limestone calcinations for clinker production.	CO_2	Yes	
		CH_4	No	Negligible.
		N_2O	No	Negligible.
	Fossil fuel consumption for clinker production	CO_2	Yes	
		CH_4	No	Negligible.
		N_2O	No	Negligible.
	Emissions from grid electricity for clinker production	CO_2	No	
		CH_4	No	Negligible.
		N_2O	No	Negligible.
Leakage	Emissions due to fossil fuels use for the transport of additives.	CO_2	Yes	
		CH_4	No	Negligible.
		N_2O	No	Negligible.

Table 4. Sources and gases included in the project boundary.

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

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Description is provided below on the application of methodology with respect to the identification of the baseline scenario and the determination of the benchmark.

As mentioned above the project is restricted to cements of resistance Class 30R. These cements are sold in 50-kilo package presentation and make up the majority of sales in Mexico.

CEMEX Mexico decided to exclude the other major resistance type sold in Mexico, Class 40, mainly for the following reason: After careful analysis CEMEX has come to the conclusion that the realistic clinker reduction potential in Class 40 in the coming years is very small; with the dynamic benchmark required by the methodology the overall CER generation would be very small.

Identification of baseline scenario.

As required by the methodology, project participants have to identify the most plausible scenario among all the realistic and credible alternatives for the relevant cement type that were available to them in the absence of the project activity and that are consistent with current rules and regulations.

The following plausible alternatives to the project activity were identified:

1. Project activity implementation not undertaken as CDM project activity;
2. Current practice continuation.

Alternative 1

In the absence of CDM, the project activity implementation would face various barriers. Therefore, this alternative is not a likely baseline scenario. This is discussed in detail in Section B.5 (Additionality assessment).

Alternative 2

This alternative is in compliance with all applicable legal and regulatory frameworks and is considered the most likely baseline scenario because it does not face any technical or market barriers. The trend over the last three years has been to increase the clinker content. Therefore this becomes the baseline scenario.

Year	CEMEX Mexico clinker content in blended cement Class 30R (%)
2004	76,97%
2005	77,34%
2006	78,43%

Table 5. CEMEX Mexico clinker content: 2004, 2005 and 2006.

Selection of region for benchmark analysis:

The “Region” for the benchmark calculation needs to be clearly determined and justified by project participants. The national market has been selected as the “Region” for benchmark analysis.

Benchmark for the baseline emission.

For the calculation of baseline emissions it is required to establish the benchmark with respect to clinker percentage in cement Class 30R. As required by the methodology, the clinker percentage is calculated as the lowest value among the following:

i) The average (weighted by production) mass percentage of clinker for the highest blend cement brands for the relevant cement type in the region; or
ii) The production weighted average mass percentage of clinker in the relevant cement type in the top 20% (in terms of share of additives) of the total production of blended cement in the region; or
iii) The mass percentage of clinker in the relevant cement type produced in the proposed project activity plant before the implementation of the CDM project activity.

To determine the clinker percentage for options i) and ii) random and statistically significant samples are selected and analyzed for the percentage of clinker by an independent laboratory (*Instituto Mexicano de Cemento y Concreto (IMCYC)*).

For Option i) the average (weighted by production) mass percentage of clinker for the 5 highest blend cement brands for the relevant cement type in Mexico is 81,04%. For the Option ii) the production weighted average mass percentage of clinker in the top 20% (in terms of share of additives) of the total production of blended cement Class 30R in Mexico is 78,38%. Data from CANACEM is used to determine clinker percentage. For Option iii) the mass percentage of clinker is 76,97% (the highest percentage of additives used of the 3 most recent years: year 2004).

The lowest clinker percentage is the Option iii) which is 76,97% and is considered as the benchmark.

As outlined in the methodology, the option to select a benchmark trend is selected. This trend is specified ex – ante, in the share of additives in the blended cement type based on the minimum of an annual 2% increase in additives.

For details on the benchmark calculation please refer to Annex 3.

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 CDM project activity (assessment and demonstration of additionality): >>

Analysis of the additionality of the project

To demonstrate the additionality of the project, the Tool for demonstration and assessment of additionality approved has been used, following all steps defined. These steps will demonstrate that the project activity is not the baseline scenario.

Step 0. Preliminary screening based on the starting date of the project activity

The crediting period will start after the registration of the project activity, so step 0 does not apply to the project activity.

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations

Sub-step 1a. Define alternatives to the project activity

All realistic scenarios have been developed in Section B.4. These alternatives are:

1. Scenario 1: Project activity implementation not undertaken as CDM project activity.
2. Scenario 2: Current practice continuation.

Sub-step 1b. Enforcement of applicable laws and regulations

Production of PPC and PCC Class 30R is subject to Mexican Standard specification: NMX C-414 ONNCCE 2004. The two plausible alternatives are in compliance with current laws and regulations.

Step 2. Investment analysis

N/A.

Step 3. Barrier analysis

The project proponent is required to determine whether the project activity faces barriers that:

(a) Prevent the implementation of this type of project activity; and
(b) Do not prevent the implementation of at least one of the alternatives through the following sub-steps

All the barriers that prevail for the project activity are detailed in Sub-step 3a.

Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity.

The project activity would increase the blend in PPC and PCC Class 30R beyond the benchmark prevailing in the country. However the project activity implementation would face various barriers. These barriers are:

Technological Barrier:

The CEMEX Mexico project consists of increasing the percentage of additives in the cement blend, maintaining the same quality (strength). One of the main problems for carrying out the project is the selection and location and source of the additives. The additives can be of natural or industrial origin, and independent of their origin, all potential additives to be used have to be analyzed in order to determine their forming components and in which proportions they can be fed, so that when they are used in the formulation of the cement, the cement complies with the quality standards applicable.

An increase of the additives percentage in cement requires the utilization of a clinker which is more reactive and with higher quality. To achieve this, CEMEX Mexico will have to develop and implement new methodologies. Within these some possible options to consider are:

- Microscopy utilization on clinker, to control that the crystal size of the different clinker compounds (alite, belite, etc.) is optimal. For this, the clinker that is being produced is analyzed by microscopy. Later, with operative changes in the calcinations process, the workers will seek for an optimal crystal size that maximizes the strength. The main changes in the process will involve areas sliding in the furnace and different residence times for each process stage; such as modifications in the velocity of cooling the clinker by controlling changes to the cooling air fluxes.
- Increase clinker reactivity by adding mineralizing materials, that is, adding materials that can mineralize clinker and increase its reactivity. First of all, before this, laboratory tests must be carried out in which the mineralizing materials are added synthetically. Laboratory clinker is produced and its reactivity is compared with normal clinker reactivity. When the optimum material and metering is found, an industrial test will be carried out to examine the new operation parameters. Later, the feasibility of working with this process in continuous manner will be evaluated.
- Chemical changes in the raw materials fed to the furnace. The aim is for main clinker components, which contribute to its quality, to become favored and in consequence yield a better quality clinker.
- Stabilization of clinker and grinding quality. A higher potential variation in quality will force operators to increase the share of clinker in cement in order to make sure that the final product complies with both Mexican norms and internal standards. Additional training for operators will be required.

To improve and maintain the quality of the cements produced in the project, CEMEX Mexico will perform one or more of the following activities:

- Development and use of quality improving additives. CEMEX will collaborate with additive suppliers looking for the formulation of new additives that will improve the cement’s quality when new materials are added/increased so as to reduce the clinker percentage used in compound cement production. There are, for instance, indications that different milling additives increase the pozzolan reactivity when reacting with lime particles; similar cases have been found with limestone.
- Optimize fineness of the final product. Milling has an impact on cement quality in several ways. A finer cement will normally give higher tensile strength (due to greater surface area), but particle size distribution is also an important factor. Finding the optimal milling conditions (ball loads, milling times, circulating load, mill filling) will require a significant effort, creativity and time-consuming experimentation.
- Utilization of more reactive additions. By changing to other, more reactive additions, clinker percentage can be decreased. For example in some plants, lime –which has almost no reactivity - is currently used as an additive; if this is changed by a pozzolanic mineral or a fly ash then the clinker percentage used can be diminished.
- Standard deviation reduction in cement milling.

All methods previously mentioned for cement and clinker quality conservation and improvement, bring as consequence, firstly, the investigation and development of methodologies/procedures and later, personnel training for its correct application. In some cases the facilities may have to be adapted with the corresponding investment involved. The equipment that could be required for project implementation will be used for metering, milling, packaging and crushing, as well as the necessary devices for laboratory tests such as microscopes and specialized equipment.

Project development requires an arduous work in the laboratory, since several tests must be carried out to achieve cement quality and state verification, and the same goes for additives. Among the tests carried out are those referring to quality improving additive characterization and new material characterization for their use as additives. Tests must also be performed on Class 30R design cement for dedicated or special applications for huge massive works.

There are also risks of failure in the mineralizing materials dosage system that could provoke problems in the operation forming a blockage in the pre-heater and/or in the formation of rings (crust in great volumes) in the kiln causing undesirable stoppages and clinker production losses. This could also lead to clinker reactivity losses, in case of deficient dosage, and damaging the kiln’s refractory, in case of excessive dosage.

Regarding chemical additives, dosage is also important. If it is deficient the required level of strength would not be obtained and the clinker content in the cement would have to be increased. If there is an excessive dosage we would incur in an additional cost without any benefit in the strength of the cement and therefore in the reduction of the clinker content and causing an additional cost.

Market Barriers

Given the common perception that a diminution in the clinker percentage brings as consequence a diminution in the strength of the cement, the following actions are predicted to be carried out by the company for the purpose of attending the possible consequences of this perception:

1. A document will be drawn up based on the analysis of the strength of the cement samples of all the plants “before” and “after” each modification of the cement formulation based on clinker and addition content with the purpose of demonstrating that there would be no deterioration of the quality of the cement.
2. A dissemination and training process of sales personnel will be made for the purpose of creating awareness that formula changes will not have any impact on the quality of the cement.
3. A team of technical consultants will be available for addressing doubts and any restlessness that could arise, derived from the changes in the cement formulation.

Investment Barriers

For carrying out the project, the following equipment and facilities will be required:

- Mineralization facilities.
- Addition dosage facilities.

- Mechanical separators replacement for high efficiency separators in cement grinding to obtain a better granulemetric distribution and thus to obtain a greater control of the strength.

It is estimated an investment between 0.8 and2.2 M USD per plant for the installation of the equipment previously mentioned, if necessary, depending on the characteristics and materials to be used as additions in each case.

Furthermore, due to the project implementation, operative costs could be increased due to the following:

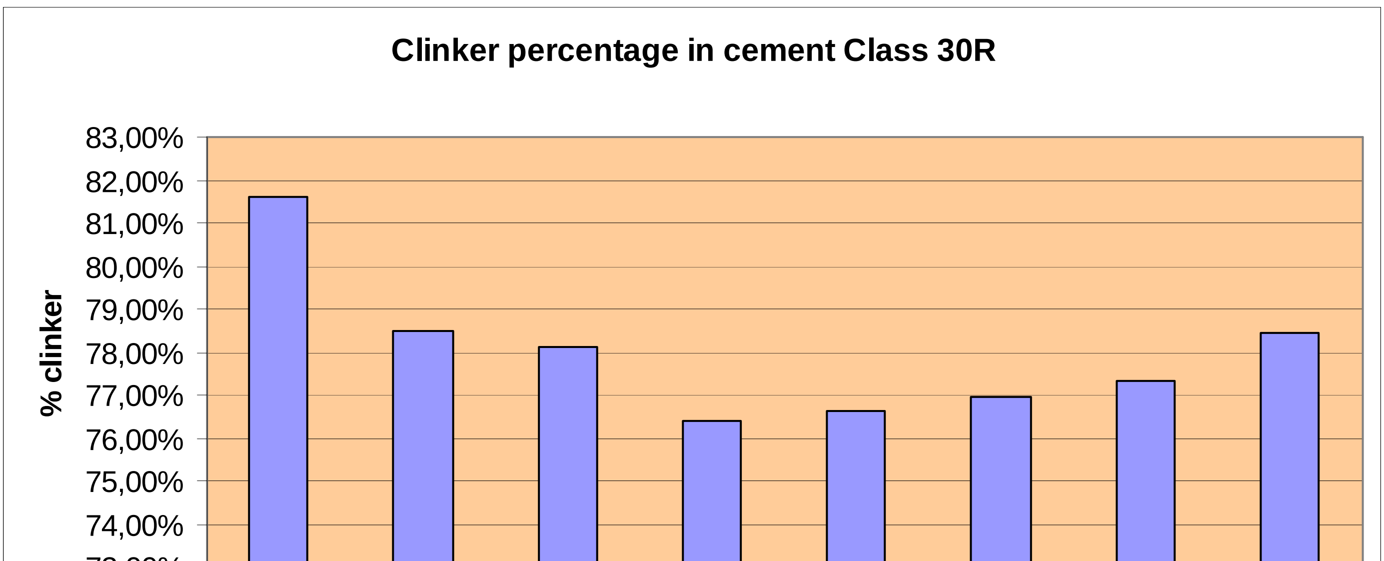
- Mineralization cost: greater costs for new materials as opposed to the conventional materials.
- High cost of the chemical additives for the clinker's quality improvement.
- Possibility of producing cement with greater finesse, this will implicate greater costs for cement grinding.

The incentive that represents the registration of the project as CDM has been considered in CEMEX Mexico and it is considered fundamental to be able to surpass the barriers described for project implementation.

Prevailing practice Barrier:

The benchmark analysis already shows that CEMEX is among the best in class in Mexico for comparable cement quality. The expected final clinker content of around 72.3% is unprecedented. The argument is even much more valuable as it does not relate to a single cement plant but to a group of 15 installations that work under different conditions; in particular, availability of active additives such as slag or fly ash is not the same quantity for each plant.

Another argument is the history of clinker content in CEMEX Mexico (see graph). After the introduction of the new norm (NMX C-414 ONNCCE, October 1999) in 1999 (which gives cement producers more options to reduce the clinker content) CEMEX began to reduce its average clinker content over several years. In 2002 this "business-as-usual reduction" came to a halt; the average clinker content stabilized and even showed a slight upward trend, indicating that CEMEX Mexico has come to a new stable situation where a new external trigger is necessary in order to achieve another reduction. This external trigger is the CDM: In June 2006 CEMEX's corporate energy department (which coordinates all of CEMEX's CDM projects) offered a workshop on the Clean Development Mechanism in Monterrey, Mexico, that was also attended by representatives of the quality control department (which now has the lead of the clinker reduction project). Motivated by the successful registration of the first projects under ACM0005, the decision was taken to explore the potential of a clinker reduction project in Mexico.



Graph 1. CEMEX Mexico clinker content (1999-2006)

Sub-step 3b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the project activity).

The alternative to the project activity is to keep the clinker ratio at the high levels observed in the base year. This alternative does not face any of the barriers identified above when compared to the project activity.

<u>Step 4. Common practice analysis</u>

Sub-step 4a. Analyze other activities similar to the proposed project activity.

The common practice in Mexico is to use a high percentage of clinker in cement Class 30R. See also documentation on benchmark.

Sub-step 4b. Discuss any similar options that are occurring.

N/A

<u>Step 5. Impact of CDM registration.</u>

CDM registration would sustain the project activity as it could offset some of the additional costs required to be incurred by the project proponent to overcome the technological and market acceptability barriers. The income from sale of CERs would also offset the technical and reputational risks that the project faces.

Moreover, the amount of CERs generated and sold will have an impact on the operational income of the plants which in turn influences the variable compensation of key personnel. Therefore the registration as a CDM will motivate people to achieve emission reductions.

Finally, registration of the project by a United Nations body will make all people involved confident of the integrity of the project and will make it much easier to achieve the internal shifts in the way people think and do things.

B.6. Emission reductions:

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B.6.1. Explanation of methodological choices:

A. Description of formulae used to estimate project emissions.

$PE_{BC,y}$ are estimated as below. In the project activity plant emissions are determined per unit of clinker or per unit of BC accounting for

- Emissions from limestone calcination;
- Emissions from fossil fuel combustion and electricity for clinker production and raw material processing;
- Emissions from electricity used for additives preparation and cement grinding.

In determining the emissions reduction there are 3 possibilities:

i. Emissions per tonne of clinker during the crediting period are less than baseline emissions per tonne of clinker ($PE_{Clinker,y} < BE_{Clinker}$); or
ii. Baseline and year Y emissions per tonne of clinker are equal ($PE_{Clinker,y} = BE_{Clinker}$); or
iii. Emissions per tonne of clinker in year Y are greater than the baseline emissions per tonne of clinker ($PE_{Clinker,y} > BE_{Clinker}$).

As this methodology is restricted to increase in percentage of blend only and not to efficiency improvements or fuel switching, in case (i), the baseline value is substituted by the project activity value. That is, if emissions per tonne of clinker are lower during the crediting period, then the lower value is taken for the baseline. The choice of the lower value aims at avoiding potential perverse incentives for project participants to increase the emissions intensity of clinker production as a result of the project activity (e.g. by switching from less carbon-intensive energy sources to more carbon intensive energy sources).

In case (iii) the emissions per tonne of clinker are higher during the crediting period than the baseline. This could be due to declining efficiency or a fuel switch or some other reason. In this case, there is a possibility that project activity emissions exceed the baseline emissions for some years in the crediting period. In this case, the project does not get new credits for emissions reduction till the net balance for the project is positive. In the case that overall negative emission reductions arise in a year, ERs are not issued to project participants for the year concerned and in subsequent years, until emission reductions from subsequent years have compensated the quantity of negative emission reductions from the year concerned.

CO_2 per tonne of blended cement in the project activity in year Y is calculated as below:

$$\mathbf{PE_{BC,y} = [PE_{clinker,y} * P_{Blend,y}] + PE_{ele\_ADD\_BC,y}}$$

Where:

$PE_{BC,y}$= CO2 emissions per tonne of BC in the project activity plant in year Y (tCO2/tonne BC)

$PE_{clinker,y}$ = CO2 emissions per tonne of clinker in the project activity plant in year Y (tCO2/tonne clinker) and defined below
$P_{Blend,y}$ = Share of clinker per tonne of BC in year Y (tonne of clinker/tonne of BC)
$PE_{ele\_ADD\_BC,y}$ = Electricity emissions for BC grinding and preparation of additives in year Y (tCO2/tonne of BC)

CO2 per tonne of clinker in the project activity in year Y is calculated as below:

$$\mathbf{PE_{clinker,y} = PE_{calcin,y} + PE_{fossil\_fuel,y} + PE_{ele\_grid\_CLNK,y}}$$

Where:

$PE_{clinker,y}$= Emissions of CO2 per tonne of clinker in the project activity plant in year Y **(**tCO2/tonne clinker)
$PE_{calcin,y}$ = Emissions per tome of clinker due to calcinations of calcium carbonate and magnesium carbonate in year Y (tCO2/tonne clinker)
$PE_{fossil\_fuel,\ y}$ = Emissions per tonne of clinker due to combustion of fossil fuels for clinker production in year Y **(**tCO2/tonne clinker)
$PE_{ele\_grid\_CLNK,y}$ = Grid electricity emissions for clinker production pa tonne of clinker in year Y **(**tCO2/tonne clinker)[1]

$$\mathbf{PE_{calcin,y} = [0.785*(OutCaO_y - InCaO_y)+ 1.092*(OutMgO_y- InMgO_y)]/ [CLNK_y* 1000]}$$

Where:

$PE_{calcin,y}$ = Emissions from the calcinations of limestone (tCO2/tonne clinker)
0.785 = Stoichiometric emission factor for CaO (tCO2/t CaO)
1.092 = Stoichiometric emission factor for MgO (tCO2/t MgO)
$InCaO_y$ = CaO content (%) of the raw material ***** raw material quantity (tonnes)
$OutCaO_y$ = CaO content (%) of the clinker ***** clinker produced (tonnes)
$InMgO_y$ = MgO content (%) of the raw material ***** raw material quantity (tonnes)
$OutMgO_y$ = MgO content (%) of the clinker ***** clinker produced (tonnes)

$$\mathbf{PE_{fossil\_fuel,\ y} = [\ \Sigma FF_{i\_,y} * EFF_i] /CLNK_{,y} * 1000}$$

Where:
$FF_{i\_,y}$ = Fossil fuel of type i consumed for clinker production in year Y (tonnes of fuel i)
EFF_i = Emission factor for fossil fuel i (tCO2 / tonne of fuel)
$CLNK_y$ = Annual production of clinker in year Y (kilo tonnes of clinker)

$$\mathbf{PE_{ele\_grid\_CLNK,\ y}= [PELE_{grid\_CLNK,y} * EF_{grid\_y}] / [CLNK_y * 1000]}$$

Where:

[1] Electricity consumption for clinker production will be supplied from the national grid.

$PELE_{grid\_CLNK, y}$ = Grid electricity for clinker production in year Y (MWh)
EF_{grid_y} = Grid emission factor in year Y (tCO2/MWh)
$CLNK_y$ = Annual production of clinker in year Y (kilotonnes of clinker)

$$\mathbf{PE_{ele\_ADD\_BC, y} = PE_{ele\_grid\_BC,y} + PE_{ele\_grid\_ADD,y}}$$

Where:
$PE_{ele\_grid\_BC}$ = Grid electricity emissions for BC grinding in year Y (tCO2/tonne of BC)
$PE_{ele\_grid\_ADD}$ = Grid electricity emissions for additive preparation in year Y (tCO2/tonne of BC)[2]

$$\mathbf{PE_{ele\_grid\_BC,y} = [PELE_{grid\_BC,y} * EF_{grid\_BSL,y}]/[BC_y * 1000]}$$

Where:
$PELE_{grid\_BC,y}$ = Baseline grid electricity for grinding BC (MWh)
EF_{grid_y} = Grid emission factor in year Y (t CO2/MWh)
BC_y = Annual production of BC in year Y (kilotonnes of BC)

$$\mathbf{PE_{ele\_grid\_ADD} = [PELE_{grid\_ADD} * EF_{grid\_y}] /[BC_y * 1000]}$$

Where:
$PELE_{grid\_ADD}$ = Grid electricity for grinding additives (MWh)
EF_{grid_y} = Grid emission factor in year Y (t CO2/MWh)
BC_y = Annual production of BC in year Y (Kilotonnes of BC)

B. Description of formulae used to estimate baseline emissions.

The formulae used for calculation of the baseline emissions are as follows:

$$\mathbf{BE_{BC,y} = [BE_{clinker} * B_{Blend,y}] + BE_{ele\_ADD\_BC}}$$

Where:
$BE_{BC,y}$ = Baseline CO_2 emissions per tonne of blended cement type (BC) (tCO2/tonne BC)
$BE_{clinker}$ = CO_2 emissions per tonne of clinker in the baseline in the project activity plant (tCO2/tonne clinker) and defined below
$B_{Blend,y}$= Baseline benchmark of share of clinker per tonne of BC updated for year Y (tonne of clinker/tonne of BC)
$BE_{ele\_ADD\_BC}$ = Baseline electricity emissions for BC grinding and preparation of additives (tCO_2/tonne of BC)

CO_2 per tonne of clinker in the baseline is calculated as below:

$$\mathbf{BE_{clinker} = BE_{calcin} + BE_{fossil\_fuel} + BE_{ele\_grid\_CLNK}}$$

Where:
$BE_{clinker}$ = Baseline emissions of CO2 per tonne of clinker in the project activity plant (tCO2 / tonne clinker)

[2] Electricity consumption for BC grinding and additive preparation will be supplied from the national gris.

BE_{calcin} = Baseline emissions per tonne of clinker due to calcinations of calcium carbonate and magnesium carbonate (tCO2 / tonne clinker)
BE_{fossil_fuel} = Baseline emissions per tonne of clinker due to combustion of fossil fuels for clinker production (tCO2/tonne clinker)
$BE_{ele\_grid\_CLNK}$ = Baseline grid electricity emissions for clinker production per tonne of clinker (tCO2/tonne clinker)

$$\mathbf{BE_{calcin} = [0.785*(OutCaO - lnCaO) + 1.092*(OutMgO - InMgO) / [CLNK_{BSL} * 1000]}$$

Where:
BE_{calcin} = Emissions from the calcinations of limestone (tCO2/tonne clinker)
0.785 = Stoichiometric emission factor for CaO (tCO2/ t CaO)
1.092 = Stoichionietric emission factor for MgO (tCO2/t MgO)
InCaO = CaO content (%) of the raw material * raw material quantity (tomes)
OutCaO = CaO content (%) of the clinker * clinker produced (tonnes)
InMgO = MgO content (%) of the raw material * raw material quantity (tonnes)
OutMgO = MgO content (%) of the clinker * clinker produced (tonnes)
$CLNK_{BSL}$ = Annual production of clinker in the base year (kilotonnes of clinker)

$$\mathbf{BE_{fossil\_fuel} = [\Sigma FF_{i\_BSL}*EFF_i] / CLNK_{BSL} *1000}$$

Where:
FF_{i_BSL} = Fossil fuel of type i consumed for clinker production in the baseline (tonnes of fuel i)
EFF_i = Emission factor for fossil fuel i (t CO2 / tonne of fuel)
$CLNK_{BSL}$ = Annual production of clinker in the base year (kilotonnes of clinker)

$$\mathbf{BE_{ele\_grid\_CLNK} = [BELE_{grid\_CLNK} * EF_{grid\_BSL}] / CLNK_{BSL} * 1000}$$

Where:
$BE_{elegrid\_CLNK}$ = Baseline grid electricity for clinker production (MWh)
EF_{grid_BSL} = Baseline grid emission factor (t CO2/MWh)
$CLNK_{BSL}$ = Annual production of clinker in the base year (kilotonnes of clinker)

$$\mathbf{BE_{ele\_ADD\_BC} = BE_{ele\_grid\_BC} + BE_{ele\_grid\_ADD}}$$

Where:
$BE_{ele\_grid\_BC}$ = Baseline grid electricity emissions for BC grinding (tCO2/tonne of BC)
$BE_{ele\_grid\_ADD}$ = Baseline grid electricity emissions for additive preparation (tCO2/tonne of BC)

$$\mathbf{BE_{ele\_grid\_BC} = [BELE_{grid\_BC} * EF_{grid\_BSL}] /[BC_{BSL}* 1000]}$$

$BELE_{grid\_BC}$ = Baseline grid electricity for grinding BC (MWh)
EF_{grid_BSL} = Baseline grid emission factor (t CO2/MWh)
BC_{BSL} = Annual production of BC in the base year (kilotonnes of BC)
BC_{BSL} = Annual production of BC in the base year (kilotonnes of BC)

$$\mathbf{BE_{ele\_grid\_ADD} = [\ BELE_{grid\_ADD} * EF_{grid\_BSL}] / [BC_{BSL} * 1000]}$$

$BELE_{grid\_ADD}$ = Baseline grid electricity for grinding additives (MWh)
EF_{grid_BSL} = Baseline grid emission factor (t CO2/MWh)

Calculation of electricity baseline emission factor.

For the calculation of the specific emissions from power generation from the grid, the approved consolidated baseline methodology ACM0002 is applied.

The electricity baseline emission factor is calculated as a Combined Margin (CM), consisting of the combination of Operating Margin (OM) and Build Margin (BM) factors according to the following steps. Calculation for this combined margin are based on data from an official source (where available) and made publicly available.

Step 1: Calculation the Operating Margin emission factor

Simple Operating Margin has been chosen for calculations since the low – cost / must run resources constitute less than 50% of the total grid generation in the National Grid.

For calculating the Simple OM, the generation-weights average emission per electricity unit (tCO_2/MWh) of all generating sources serving the system excluding the low-cost/must run generation units is used:

$$EF_{OM,y} = \frac{\sum_{i,j} F_{i,j,y}.COEF_{i,j}}{\sum_{j} GEN_{j,y}}$$

Where:

$F_{i,j,y}$ is the consumption of fuel i (in TJ) by fuel sources j in year y
j, refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports to the grid,
$COEF_{i,j,y}$ is the CO_2 emission coefficient of fuel i in tCO_2/TJ
$GEN_{j,y}$ is the electricity in MWh delivered to the grid by the j source

This $COEF_{i,j}$ (in tC/TJ) can be found in the Revised 1996 IPCC Guidelines for Greenhouse Gas Inventories: Workbook,. Data for F_{ij} can be found in TJ/day in the three *Prospectivas* so total annual consumption per fuel source can be calculated by multiplying by 365.

Step 2. Calculate the Build Margin emission factor ($EF_{BM,}$) as the generation-weighted average emission factor (tCO_2/GWh) of a sample of power plants *m*, as follows:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} . COEF_{i,m}}{\sum_{m} GEN_{m,y}}$$

Where $F_{i,m,y}$, $COEF_{i,m}$ and $GEN_{m,y}$ are analogous to the variables described for the simple OM method above for plants m.

This sample for power plants can be chosen from the two options proposed under the methodology. We have chosen Option 1. Calculate the Build Margin emission factor $EF_{BM,y}$ ex-ante based on the most recent information available on plants already built for sample group *m* at the time of PDD submission. For this option, the sample has to be either:

Option A: The five power plants that have been built most recently.
Option B: Or the power plants capacity additions in the electricity system that comprises 20% of the system generation (in GWh) and that have been built most recently.

Option B has been selected to calculate the BM because generation of five power plants built most recently is lower than 20% of the system generation (in GWh).

The following plants have been used to calculate the BM:

Name	Capacity (MW)	Technology
2005 Additions		
Hol Box	0,8	IC
La Laguna II	498	CC
Rio Bravo IV	500	CC
Botello	9	Hydro
Baja California Sur I	42,9	IC
Yécora	0,7	IC
Ixtaczoquitlán	1,6	Hydro
Hermosillo	93,3	CC
2004 Additions		
Chicoasén (Manuel Moreno Torres)	900	Hydro
Rio Bravo III PIE	495	CC
El Sauz*	128	CC
Tuxpan (Pdte. Adolfo López Mateos)	163	GT
San Lorenzo Potencia	266	GT
Guerrero Negro II	10.8	IC
2003 Additions:		
Los Azufres	79.8	Geo
Los Azufres	26.8	Geo
Tuxpan III y IV (PIE)	983	CC
Altamira III y IV (PIE)	1036	CC
Mexicali (PIE)	489	CC

Transalta Campeche (PIE)	252.4	CC
Naco Nogales (PIE)	258	CC
Transalta Chihuahua III (PIE)	259	CC
2002 Additions:		
Hol Box	0.8	IC
Bajío	591.7	CC
Altamira II	495	CC
Río Bravo II	495	CC
Monterrey III	449	CC
Valle de Mexico	249.3	GT/CC
El Sauz	129	GT/CC
El Encino	130.8	GT

Table 6. Source: Sener. "*Prospectiva del sector eléctrico 2006-2015 Cuadro 13 p.57;Prospectiva del sector eléctrico 2005-2014 Cuadro 14 p.51; Prospectiva del sector eléctrico 2004-2013 Cuadro 9 p.44* and *Prospectiva del sector eléctrico 2003-2012 Cuadro 8 p.41*". Abbreviations: Hydro: hydropower plant; Geo: geothermal plant, CC: combined cycle plant, fuelled with natural gas, GT: Gas turbine, fuelled with natural gas. . IC: Internal combustion.

The technical data of typical power plants are given in the source as follows:

	Capacity (MW)	Efficiency (%)
Gas turbine	1 x 42.6	37.55
	1 x 85	29.76
	1 x 190	33.81
	1 x 261	35.73
	1 x 41.4	**38.08**
Diesel	3 x 3.4	43.53
	3 x 13.5	47.35
	2 x 18.7	**47.61**
Combined Cycle	1 x 290	51.85
	1 x 581	52.03
	1 x 388	52.46
	1 x 776	**52.58**

Table 7. Technical data of typical fossil power plants of the types installed in the last years. Best-in-class values are highlighted. Source: Sener. "Prospectiva del sector eléctrico 2005-2014 Cuadro 40 p.94"

C. Description of formulae used to estimate leakage

Emissions due to fuel use for the transport of raw materials, fossil fuels and additives from off site locations to the project plants. The transport related emissions for raw materials and fuels are likely to decrease. To keep the methodology conservative, this change shall not be included. Because of the project activity, emissions due to transportation of additives will increase. These emissions will be accounted as leakage. Transport related emissions linked to additives per tonne of additive are calculated as below:

$$\mathbf{L_{add\_trans} = [(TF_{cons} * D_{add\_source} * TEF) * 1/Q_{add} * 1/1000 + (ELE_{conveyor\_ADD} * EF_{grid}) * 1/ADD_y]}$$

Where:

L_{add_trans} = Transport related emissions per tonne of additives (tCO2 / tonne of additive)

TF_{cons} = Fuel consumption for the vehicle per kilometre (kg of fuel / kilometre)
D_{add_source} = Distance between the source of additive and the project activity plant (km)
TEF = Emission factor for transport fuel (kg CO2/kg of fuel)
$ELE_{conveyor\_ADD}$ = Annual Electricity consumption for conveyor system for additives (MWh)
EF_{grid} = Grid electricity emission factor (tonnes of CO2/MWh)
Q_{add} = Quantity of additive carried in one trip per vehicle (tonnes of additive)
ADD_y = Annual consumption of additives in year y (t of additives)
And leakage emissions per tonne of BC due to additional additives are determined by

$$\mathbf{L_y = L_{add\_trans} * [A_{blend,y} - P_{blend,y}] * BC_y}$$

Where:
L_y = Leakage emissions for transport of additives (kilotonnes of CO2)
$A_{blend,y}$ = Baseline benchmark share of additives per tonne of BC updated for year Y (tonne of additives / tonne of BC)
$P_{blend,y}$ = Share of additives per tonne of BC in year Y (tonne of additives / tonne of BC)

Another possible leakage is due to the diversion of additives from existing uses. The PPs shall demonstrate that additional amounts of additives used are surplus. If the PPs do not substantiate x tones of additives are surplus, the project emissions reductions are reduced by the factor a, which is defined as:

$\boldsymbol{\alpha}_y$ = x tonnes of additives in year Y / total additional additives used in year Y

D. Description of formulae used to estimate emission reductions for the project activity

The project activity mainly reduces CO_2 emissions through substitution of clinker in cement by blending materials. Emissions reductions in year Y are the difference in the CO2 emissions per tonne of BC in the baseline and in the project activity multiplied by the production of BC in year Y. The emissions reductions are discounted for the percentage of additives for which surplus availability is not substantiated.

Emission reductions by the project activity

$$\mathbf{ER_y = \{[BE_{BC,y} - PE_{BC,y}] * BC_y + L_y\} * (1 - \alpha_y)}$$

Where:
ER_y = Emission reductions in year Y due to project activity (thousand tonnes of CO2)
$BE_{BC,y}$ = Baseline emissions per tonne of BC (tCO2/tones of BC)
$PE_{BC,y}$ = Project emissions per tonne of BC in year Y (tCO2/tonnes of BC)
BCy = BC production in year Y (thousand tonnes)
L_y = Leakage emissions for transport of additives (kilotonnes of CO2)
α_y = x tones of additives in year Y / total additional additives used in year y

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

(Copy this table for each data and parameter)

Data and parameters for leakage.

Data / Parameter:	**TEF**
Data unit:	kg CO_2/kg of fuel
Description:	Emission factor for transport fuel
Source of data used:	IPCC default values
Value applied:	3.21 kg CO_2/kg of fuel
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated, once at the beginning of the crediting period, archived electronically.
Any comment:	The value applied is derived from multiplication of net calorific value of diesel and carbon emission factor of diesel. Both default values are available from IPCC.

Data and parameters for project and baseline scenario.

Data / Parameter:	**EFF_i**
Data unit:	tCO_2/TJ
Description:	Emission factor for fossil fuel
Source of data used:	IPCC default values
Value applied:	Coal: 96.07 tCO_2/TJ Pet coke: 100.83 tCO_2/TJ Fuel oil: 77.37 tCO_2/TJ Natural gas: 56.1 tCO_2/TJ Diesel: 74.07 tCO_2/TJ Used oils: 77.37 tCO_2/TJ Tyres: 85 tCO_2/TJ Others: 0 tCO_2/TJ (conservative approach)
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated, once at the beginning of the crediting period, archived electronically.
Any comment:	The value applied is derived from carbon content of fossil fuels. Both default values are available from IPCC.

Data / Parameter:	**EF_{grid_y} and EF_{grid_BSL}**
Data unit:	tCO_2/MWh

Description:	Grid Emission factor for baseline and project scenario.
Source of data used:	SENER (Secretaría de Eenrgía) and CFE (Comisión Federal de Electricidad).
Value applied:	0.523 tCO_2/MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated, once at the beginning of the crediting period, archived electronically. This value is determined ex – ante under the methodology ACM0002.
Any comment:	This value is fixed for the project and baseline scenario.

B.6.3 Ex-ante calculation of emission reductions:

>>

Please see Annex 3.

B.6.4 Summary of the ex-ante estimation of emission reductions:

>>

Total emission reduction during the crediting period: 2.863.338 tCO_2 (See Annex 3)

Estimation of emission reductions:

Year	Estimation of project activity emissions (tonnes of CO_2 e)	Estimation of baseline emissions (tonnes of CO_2 e)	Estimation of leakage (tonnes of CO_2 e)	Estimation of overall emission reductions (tonnes of CO_2 e)
2008	8.867.078	9.119.971	-3.401	249.492
2009	9.134.359	9.484.631	-4.711	345.560
2010	9.430.914	9.872.971	-5.946	436.111
2011	9.801.812	10.227.785	-5.729	420.244
2012	10.174.281	10.554.317	-5.111	374.924
2013	10.530.381	10.859.419	-4.426	324.612
2014	10.898.944	11.172.949	-3.685	270.320
2015	11.280.407	11.495.124	-2.888	211.829
2016	11.675.222	11.826.164	-2.030	148.913
2017	12.083.854	12.166.296	-1.109	81.333
Total (tonnes of CO2 e)	106.779.628	103.877.253	-39.037	2.863.338

Table 8. Ex-ante estimation emission reductions.

The registration of the project will take place before its commissioning, so there will be no emission reductions prior to its registration.

B.7 Application of the monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data and parameters monitored for baseline and project emissions:

Note: Table template has slightly been adjusted to reduce total number of pages in PDD.

	Project Scenario	**Baseline Scenario**
Data / Parameter:	In CaOy content	In CaOBSL content
Data unit:	%	%
Description:	CaO content (%) of the raw material	CaO content (%) of the raw material
Source of data to be used:	Plants records (SICA)	Plant records (SICA)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	A complete spreadsheet will be provided to the Designated Operational Entity (DOE)	A complete spreadsheet will be provided to the Designated Operational Entity (DOE)
Description of measurement methods and procedures to be applied:	Chemical analysis by analytical / x-ray methods. Recording frequency: Daily.	Chemical analysis by analytical / x-ray methods. Recording frequency: Daily.
QA/QC procedures to be applied:	X-ray analysis procedures.	X-ray analysis procedures.
Any comment:	It will be estimated as part of normal operations.	It will be estimated as part of normal operations

	Project Scenario	**Baseline Scenario**
Data / Parameter:	Out CaOy content	Out CaOBSL content
Data unit:	%	%
Description:	CaO content (%) of the clinker	CaO content (%) of the clinker
Source of data to be used:	Plants records (SICA)	Plant records (SICA)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	A complete spreadsheet will be provided to the Designated Operational Entity (DOE)	A complete spreadsheet will be provided to the Designated Operational Entity (DOE)
Description of measurement methods and procedures to be applied:	Chemical analysis by analytical / x-ray methods. Recording frequency: Daily.	Chemical analysis by analytical / x-ray methods. Recording frequency: Daily.
QA/QC procedures to be applied:	X-ray analysis procedures.	X-ray analysis procedures.
Any comment:	It will be estimated as part of normal operations	It will be estimated as part of normal operations

	Project Scenario	**Baseline Scenario**
Data / Parameter:	In MgOy content	In MgOBSL content
Data unit:	%	%

Description:	MgO content (%) of the raw material	MgO content (%) of the raw material
Source of data to be used:	Plants records (SICA)	Plant records (SICA)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	A complete spreadsheet will be provided to the Designated Operational Entity (DOE)	A complete spreadsheet will be provided to the Designated Operational Entity (DOE)
Description of measurement methods and procedures to be applied:	Chemical analysis by analytical / x-ray methods. Recording frequency: Daily.	Chemical analysis by analytical / x-ray methods. Recording frequency: Daily.
QA/QC procedures to be applied:	X-ray analysis procedures.	X-ray analysis procedures.
Any comment:	It will be estimated as part of normal operations	It will be estimated as part of normal operations

	Project Scenario	**Baseline Scenario**
Data / Parameter:	Out MgOy content	Out MgOBSL content
Data unit:	%	%
Description:	MgO content (%) of the clinker	MgO content (%) of the clinker
Source of data to be used:	Plants records (SICA)	Plant records (SICA)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	A complete spreadsheet will be provided to the Designated Operational Entity (DOE)	A complete spreadsheet will be provided to the Designated Operational Entity (DOE)
Description of measurement methods and procedures to be applied:	Chemical analysis by analytical / x-ray methods. Recording frequency: Daily.	Chemical analysis by analytical / x-ray methods. Recording frequency: Daily.
QA/QC procedures to be applied:	X-ray analysis procedures.	X-ray analysis procedures.
Any comment:	It will be estimated as part of normal operations	It will be estimated as part of normal operations

	Project Scenario	**Baseline Scenario**
Data / Parameter:	CLNKy	CLNKBSL
Data unit:	Kilotonnes	Kilotonnes
Description:	Clinker produced	Clinker produced
Source of data to be used:	Plants records (GrafOper)	Plant records (GrafOper)
Value of data applied for the purpose of calculating expected	See Annex 3.	See Annex 3.

emission reductions in section B.5		
Description of measurement methods and procedures to be applied:	Continuous weighing and recording system. Recording frequency: Daily.	Continuous weighing and recording system. Recording frequency: Daily.
QA/QC procedures to be applied:	Data will be recorded from scales or flow meters and corrected with inventories.	Data will be recorded from scales or flow meters and corrected with inventories.
Any comment:	It will be calculated as part of normal operations.	It will be calculated as part of normal operations.

	Project Scenario	**Baseline Scenario**
Data / Parameter:	Quantity of raw material	Quantity of raw material
Data unit:	Kilotonnes	Kilotonnes
Description:	Raw materials consumed for the clinker production.	Raw materials consumed for the clinker production.
Source of data to be used:	Plants records (GrafOper)	Plant records (GrafOper)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	A complete spreadsheet will be provided to the Designated Operational Entity (DOE)	A complete spreadsheet will be provided to the Designated Operational Entity (DOE)
Description of measurement methods and procedures to be applied:	Continuous weighing and recording system. Recording frequency: Daily.	Continuous weighing and recording system. Recording frequency: Daily.
QA/QC procedures to be applied:	Data will be recorded from scales or flow meters.	Data will be recorded from scales or flow meters.
Any comment:	It will be metered as part of normal operations.	It will be metered as part of normal operations.

	Project Scenario	**Baseline Scenario**
Data / Parameter:	BC_y	BC_{BSL}
Data unit:	Kilotonnes	Kilotonnes
Description:	Blended cement production.	Blended cement production.
Source of data to be used:	Plants records (GrafOper)	Plant records (GrafOper)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	See Annex 3.	See Annex 3.
Description of measurement methods	Continuous weighing and recording system. Recording frequency: Daily.	Continuous weighing and recording system. Recording frequency: Daily.

and procedures to be applied:		
QA/QC procedures to be applied:	Data will be recorded from scales or flow meters.	Data will be recorded from scales or flow meters.
Any comment:	It will be metered as part of normal operations.	It will be metered as part of normal operations.

	Project Scenario	**Baseline Scenario**
Data / Parameter:	PELEgrid_CLNK	BELEgrid_CLNK
Data unit:	MWh	MWh
Description:	Grid electric power consumed during clinker production.	Grid electric power consumed during clinker production.
Source of data to be used:	Plants records (GrafOper)	Plant records (GrafOper)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	A complete spreadsheet will be provided to the Designated Operational Entity (DOE)	A complete spreadsheet will be provided to the Designated Operational Entity (DOE)
Description of measurement methods and procedures to be applied:	Measured on the metering equipment of CFE (Comisión Federal de Electricidad). Recording frequency: Monthly.	Measured on the metering equipment of CFE (Comisión Federal de Electricidad). Recording frequency: Monthly
QA/QC procedures to be applied:	Data will be recorded and verified from power (kW) meters.	Data will be recorded and verified from power (kW) meters.
Any comment:	It will be measured as part of normal operations.	It will be measured as part of normal operations.

	Project Scenario	**Baseline Scenario**
Data / Parameter:	PELEgrid_BC,y	BELEgrid_BC
Data unit:	MWh	MWh
Description:	Grid electric power consumed for blended cement production.	Grid electric power consumed for blended cement production.
Source of data to be used:	Plants records (GrafOper)	Plant records (GrafOper)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	A complete spreadsheet will be provided to the Designated Operational Entity (DOE)	A complete spreadsheet will be provided to the Designated Operational Entity (DOE)
Description of measurement methods and procedures to be applied:	Measured on the metering equipment of CFE (Comisión Federal de Electricidad). Recording frequency: Monthly	Measured on the metering equipment of CFE (Comisión Federal de Electricidad). Recording frequency: Monthly
QA/QC procedures to be applied:	Data will be recorded and verified from power (kW) meters.	Data will be recorded and verified from power (kW) meters.

Any comment:	It will be metered as part of normal operations.	It will be metered as part of normal operations.

	Project Scenario	**Baseline Scenario**
Data / Parameter:	PELEgrid_ADD,y	BELEgrid_ADD
Data unit:	MWh	MWh
Description:	Grid electric power consumed for the blended cement production.	Grid electric power consumed for the blended cement production.
Source of data to be used:	Plants records (GrafOper)	Plant records (GrafOper)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	A complete spreadsheet will be provided to the Designated Operational Entity (DOE)	A complete spreadsheet will be provided to the Designated Operational Entity (DOE)
Description of measurement methods and procedures to be applied:	Measured on the metering equipment of CFE (Comisión Federal de Electricidad). Recording frequency: Monthly	Measured on the metering equipment of CFE (Comisión Federal de Electricidad). Recording frequency: Monthly
QA/QC procedures to be applied:	Data will be recorded and verified from power (kW) meters.	Data will be recorded and verified from power (kW) meters.
Any comment:	It will be metered as part of normal operations.	It will be metered as part of normal operations.

	Project Scenario	**Baseline Scenario**
Data / Parameter:	PEcalcin,y	BEcalcin,BSL
Data unit:	tCO_2/tonne of clinker	tCO_2/tonne of clinker
Description:	Emissions due to calcinations of calcium carbonate and magnesium carbonate.	Emissions due to calcinations of calcium carbonate and magnesium carbonate.
Source of data to be used:	Plants records	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	See Annex 3.	See Annex 3.
Description of measurement methods and procedures to be applied:	Calculated under the formula provided by the Approved Methodology ACM0005. Recording frequency: Annually.	Calculated under the formula provided by the Approved Methodology ACM0005. Recording frequency: Annually.
QA/QC procedures to be applied:		
Any comment:		

	Project Scenario	**Baseline Scenario**

Data / Parameter:	PEfossil_fuel,y	BEfossil_fuel,BSL
Data unit:	tCO_2/tonne of clinker	tCO_2/tonne of clinker
Description:	Emissions due to combustion of fossil fuel for clinker production.	Emissions due to combustion of fossil fuel for clinker production.
Source of data to be used:	Plants records	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	See Annex 3.	See Annex 3.
Description of measurement methods and procedures to be applied:	Calculated under the formula provided by the Approved Methodology ACM0005. Recording frequency: Annually.	Calculated under the formula provided by the Approved Methodology ACM0005. Recording frequency: Annually.
QA/QC procedures to be applied:		
Any comment:		

	Project Scenario	**Baseline Scenario**
Data / Parameter:	PEele_grid_CLNK,y	BEele_grid_CLNK,BSL
Data unit:	tCO_2/tonne of clinker	tCO_2/tonne of clinker
Description:	Grid electricity emissions for clinker production.	Grid electricity emissions for clinker production.
Source of data to be used:	Plants records	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	See Annex 3.	See Annex 3.
Description of measurement methods and procedures to be applied:	Calculated under the formula provided by the Approved Methodology ACM0005. Recording frequency: Annually.	Calculated under the formula provided by the Approved Methodology ACM0005. Recording frequency: Annually.
QA/QC procedures to be applied:		
Any comment:		

	Project Scenario	**Baseline Scenario**
Data / Parameter:	PEele_grid_BC,y	BEele_grid_BC,BSL
Data unit:	tCO_2/tonne of blended cement	tCO_2/tonne of blended cement
Description:	Grid electricity emissions for grinding blended cement.	Grid electricity emissions for grinding blended cement.
Source of data to be used:	Plants records	Plant records

Value of data applied for the purpose of calculating expected emission reductions in section B.5	See Annex 3.	See Annex 3.
Description of measurement methods and procedures to be applied:	Calculated under the formula provided by the Approved Methodology ACM0005. Recording frequency: Annually.	Calculated under the formula provided by the Approved Methodology ACM0005. Recording frequency: Annually.
QA/QC procedures to be applied:		
Any comment:		

	Project Scenario	**Baseline Scenario**
Data / Parameter:	PEele_grid_ADD,y	BEele_grid_ADD,BSL
Data unit:	tCO_2/tonne of blended cement	tCO_2/tonne of blended cement
Description:	Grid electricity emissions for the preparation of additives in blended cement.	Grid electricity emissions for the preparation of additives in blended cement.
Source of data to be used:	Plants records	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	See Annex 3.	See Annex 3.
Description of measurement methods and procedures to be applied:	Calculated under the formula provided by the Approved Methodology ACM0005. Recording frequency: Annually.	Calculated under the formula provided by the Approved Methodology ACM0005. Recording frequency: Annually.
QA/QC procedures to be applied:		
Any comment:		

	Project Scenario	**Baseline Scenario**
Data / Parameter:	$P_{Blend,y}$	$B_{Blend,BSL}$
Data unit:	Tonne of clinker /tonne of blended cement.	Tonne of clinker /tonne of blended cement.
Description:	Share of clinker per tonne of blended cement.	Share of clinker per tonne of blended cement defined as benchmark of the Mexican market.
Source of data to be used:	Plants records	Plant records
Value of data applied for the purpose of calculating expected	See Annex 3.	See Annex 3.

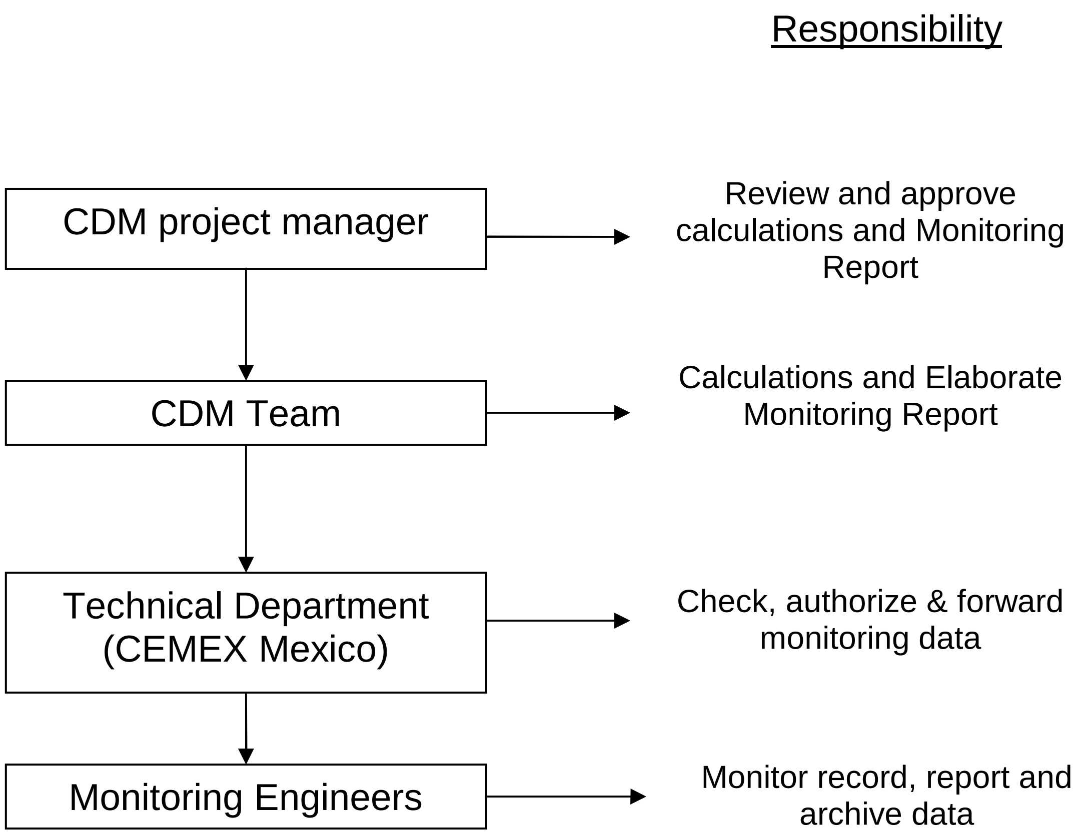
emission reductions in section B.5		
Description of measurement methods and procedures to be applied:	Calculated by formulae: Clinker consumed / Blended cement produced. Recording frequency: Annually.	Calculated under the Approved Methodology ACM0005 and updated with an ex – ante trend. Recording frequency: Annually.
QA/QC procedures to be applied:		
Any comment:		

B.7.2 Description of the monitoring plan:

>>

The project meets the applicability criteria under the approved monitoring methodology ACM0005 Version 05 (“Consolidated Monitoring Methodology for Increasing the Blend Cement Production”).

This figure describes the operational and management structure that will monitor emissions reductions generated by the project activity. All data and calculation formula required to proceed is given in Section B.6.1 and B.7.1.



Emission Monitoring and Calculation Procedure	
Data Source and collection	Data are taken from Operations, Technical and Logistic Department for each cement plant.
	Most data are available and recorded according to the actual data management system (GrafOper and SICA).
	Frequency of data is based on actual data management system.
	Data are monitored by monitoring engineers for each cement plant. All data are reviewed by Technical Department.
Data compilation	All data from every plant is centralised at Monterrey.
	Data is transmitted to CDM Team
Emission calculation and Monitoring Report	Emission calculations are conducted on yearly basis from data which is collected daily, monthly or annually, depending on the nature of the data.
	All data is calculated by CDM Team, using a excel spreadsheet. Monitoring Report will be elaborated by CDM Team.
Emission data review and approval	Calculation and Monitoring Report is reviewed and approved by CDM project manager.
Record keeping	All data will be recorded electronically. Monitoring engineers are responsible for record keeping.

Table 9. Monitoring procedures.

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

>>
Date of completion: April 2007

David López Alonso.
CDM Project Manager
CO_2 Global Solutions International, S.A.

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:

>>
01/01/2008.

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

>>
The operational lifetime of the project activity is estimated to about 25 years.

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:

>>
N/A

C.2.1.2. Length of the first crediting period:

>>
N/A

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
01/01/2008

C.2.2.2. Length:

>>
10 years

SECTION D. Environmental impacts

>>

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

>>
The project activity under consideration does not require any Environmental Authorization from the host country as it does not fall under the project category which requires mandatory EIA study for clearance. However the impact of the activity on the environment has been meticulously examined by the project proponent.

Direct reduction in GHG emissions: Clinker production is the main source of CO2 emission in cement production. By reducing the clinker content in the cement production the CO2 emissions are reduced proportionately due to reduction in the consumption of fossil fuels and calcinations emissions.

Disposal of industrial wastes: Fly ash is a waste product from thermal power plants. Fly ash, if not utilized, will result in severe environmental pollution. By increasing the utilization of fly ash these adverse affectations can be eliminated. Slag is an industrial waste from the steel industry. This waste would be disposed of in a sustainable manner in cement plants.

Resource conservation: The project activity conserves resources in the following way:

- Reduction in the quantity of limestone required for cement production.
- Reduction of fossil fuels used for cement production.

This resource conservation helps in sustainable development by:

- Reducing in quarry mining for limestone extraction.
- Reducing associated fugitive dust emissions.
- Reducing land destruction and erosions arising from such activities.
- Reducing adverse health impacts caused from quarrying of materials on nearby habitats and ecosystem.

Thus, there are positive impacts from the project activity.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

Environmental impacts of the project activity are not considered significant by the project participants or the Host country.

SECTION E. Stakeholders' comments

>>

E.1. Brief description how comments by local stakeholders have been invited and compiled:

>>

Stakeholder comments have been obtained through two routes:

- National stakeholders: The project participant has interviewed the following authorities and entities:
  - CANACEM (*"Cámara Nacional de Cementos"*) has been informed of the project activity. CANACEM has expressed a positive global opinion since the project activity reduces GHG emissions and contributes to the sustainable development.
  - *Designated National Authority* (DNA). Under the terms proposed, the implementation of the project activity proposed will contribute to the Mexico's sustainable development. Promotion of these kinds of projects would be very interesting in Mexico. DNA has expressed directly about the sustainability of the project where they found that there are no related environmental risks.
  - IMCYC (*Instituto Mexicano de Cemento y Concreto*). IMCYC had no objection to the development of the project activity. It was considered that clinker reduction remaining constant the cement quality will have to overcome multiple barriers.
  - Cement users such as architects and civil engineers were interviewed. Cement users have been informed of the project activity. They agree with the project development and they argued that the implementation of the project activity will result in several environmental and global benefits.

- Local stakeholders: the local stakeholder consultation process was carried out as follows:

  - CEMEX Mexico invited different groups from the local community for each cement plant: neighbours, personnel of the plant, local authorities, etc.
  - The project activity was presented to the local stakeholders.

- After the presentation, doubts were cleared and CEMEX proceeded to give to each participant a questionnaire in which it was asked their opinion about the project, their concerns and if they agreed or not for CEMEX develop this project.

E.2. Summary of the comments received:

>>

No objections have been received.

E.3. Report on how due account was taken of any comments received:

>>

NA

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

PRIMARY PROJECT SPONSOR

Organization:	CEMEX Mexico, S.A. de C.V.
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Represented by:	Carlos Alberto Tule
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Salutation:	Mr.
Last Name:	Tule
Middle Name:	Alberto
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Direct FAX:	00 52 81 8328 3293
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CONSULTANT

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

N/A

Annex 3

BASELINE INFORMATION

Note: Complete spreadsheets will be provided to the DOE.

Data Type	Source
Benchmark Analysis	
Cement Class 30R production per cement group	CANACEM
Installed capacity for cement production per cement group	Public information, newspapers, and cement group web page.
Clinker content in cement production in each cement group	IMCYC
Data on CEMEX cement plants	
Cement plant locations	CEMEX
Clinker production	Grafoper (CEMEX database)
Cement production	Grafoper (CEMEX database)
Fuels consumption	Grafoper (CEMEX database)
Electricity consumption	Grafoper (CEMEX database)
Additives content on cement production	Grafoper (CEMEX database)
CaO and MgO content in raw materials and clinker production	SICA (CEMEX database)
Leakage	
Fuel consumption	CEMEX
Distance	CEMEX
Load Capacity	CEMEX
Electricity Emission Factor	
Data required for calculations such as fuels consumption, generation sources, electricity production, etc.	CFE (Federal Commission of Electricity)

Benchmark Analysis:

<u>Mexican cement companies</u>

CEMEX Mexico
Company A
Company B
Company C
Company D
Company E

Company D has been excluded from the Benchmark Analysis because it does not face similar technical and market circumstances. An independent survey has been carried out by the *Instituto Tecnológico y de Estudios Superiores de Monterrey* to demonstrate that Company D is not comparable to the rest of cement market. This survey will be provided to the Designated Operational Entity.

<u>Grey Portland cements production in Mexican market:</u>

Company	Cement Class 30R production 2006 (tonnes)	Cement production 2006 (tonnes)
A	2.922.899	3.653.624
B	4.769.998	5.962.497
C	355.515	444.394
E	810.330	1.012.912
CEMEX	12.316.522	18.751.577
Total		

Source: CANACEM (*Cámara Nacional de Cemento*); Cement Industry in Mexico "International Business Strategies"; CEMEX Mexico.

In Mexico most cement sales are done in 50-kilo package presentations (cement Class 30R). These sales by representatives account for over 80% of total sales (*International Business Strategies*). Therefore cement Class 30R production is estimated as 80% of Grey Cement Portland production.

Cement production data are not available by cement plant. Therefore to be conservative the maximum capacity has been assumed where clinker percentage is the lowest for each company.

Company	Cement production (tonnes)	Weighted average clinker content (%)	% of production (%)	Accumulated % of production (%)
C	355.515	76,50%	1,68%	1,68%
CEMEX	12.316.522	78,43%	58,16%	**59,84%**
A	2.922.899	79,20%	13,80%	73,65%
B	4.769.998	86,94%	22,53%	96,17%
E	810.330	94,50%	3,83%	100,00%

CEMEX Historical data analysis

	2004		2005		2006	
	Production (tBC)	% clinker	Production (tBC)	% clinker	Production (tBC)	% clinker
Atotonilco	707.901	70,44%	844.519	75,79%	892.514	78,41%
Barrrientos	119.857	73,90%	87.471	75,20%	124.561	79,04%
Campana	17.425	77,38%	45.531	75,95%	14.560	80,31%
Ensenada	323.183	73,11%	285.177	76,75%	298.230	76,99%
Guadalajara	487.785	71,89%	506.588	69,71%	450.134	69,03%
Hidalgo	0	0,00%	0	0,00%	0	0,00%
Huichapan	1.374.064	73,97%	1.698.871	75,63%	1.502.346	72,77%
Merida	668.059	87,73%	663.363	87,50%	784.325	87,58%
Monterrey	775.022	84,55%	807.315	83,71%	908.349	84,01%
Tamuín	1.636.572	82,25%	1.627.580	82,69%	1.531.293	83,04%
Tepeaca	1.457.957	71,11%	2.153.359	72,02%	2.752.833	74,19%
Torreón	756.936	85,64%	625.450	88,48%	647.042	88,69%
Valles	65.690	84,75%	5.325	91,23%	27.587	91,83%
Yaqui	1.152.804	77,71%	1.044.981	79,14%	1.097.114	81,94%
Zapotiltic	930.039	68,08%	1.038.678	68,12%	1.285.634	74,24%
CEMEX	10.473.293	76,97%	11.434.208	77,34%	12.316.522	78,43%

Baseline emissions:

- Option (i), 5 highest blend cement brands: **81,04%**.
- Option (ii), Top 20%: **78,38%**.
- Option (iii), mass percentage of clinker before the implementation of the CDM project activity: **76,97%**.

Projected clinker content at CEMEX Mexico`s plants.during the crediting period.

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Atotonilco (cement prodcution)	tBC	933.569	976.514	1.022.410	1.065.351	1.105.834	1.144.539	1.184.597	1.226.058	1.268.970	1.313.384
Atotonilco (clinker percentage)	%	74,38%	73,38%	72,38%	71,38%	71,38%	71,38%	71,38%	71,38%	71,38%	71,38%
Barrrientos (cement prodcution)	tBC	130.290	136.284	142.689	148.682	154.332	159.734	165.324	171.111	177.100	183.298
Barrrientos (clinker percentage)	%	78,30%	77,30%	76,30%	75,30%	75,30%	75,30%	75,30%	75,30%	75,30%	75,30%
Campana (cement prodcution)	tBC	15.230	15.930	16.679	17.380	18.040	18.672	19.325	20.001	20.701	21.426
Campana (clinker percentage)	%	77,60%	75,60%	73,60%	72,60%	72,60%	72,60%	72,60%	72,60%	72,60%	72,60%
Ensenada (cement prodcution)	tBC	311.948	326.298	341.634	355.983	369.510	382.443	395.828	409.682	424.021	438.862
Ensenada (clinker percentage)	%	68,80%	68,80%	68,80%	68,80%	68,80%	68,80%	68,80%	68,80%	68,80%	68,80%
Guadalajara (cement prodcution)	tBC	470.840	492.499	515.646	537.303	557.721	577.241	597.444	618.355	639.997	662.397
Guadalajara (clinker percentage)	%	65,71%	64,71%	63,71%	62,71%	62,71%	62,71%	62,71%	62,71%	62,71%	62,71%
Hidalgo (cement prodcution)	tBC	8.000	8.368	8.761	9.129	9.476	9.808	10.151	10.506	10.874	11.255
Hidalgo (clinker percentage)	%	80,00%	78,00%	77,00%	77,00%	77,00%	77,00%	77,00%	77,00%	77,00%	77,00%
Huichapan (cement prodcution)	tBC	1.571.454	1.643.741	1.720.996	1.793.278	1.861.423	1.926.573	1.994.003	2.063.793	2.136.026	2.210.786
Huichapan (clinker percentage)	%	69,40%	68,40%	67,40%	67,40%	67,40%	67,40%	67,40%	67,40%	67,40%	67,40%
Merida (cement prodcution)	tBC	820.404	858.143	898.475	936.211	971.787	1.005.800	1.041.003	1.077.438	1.115.148	1.154.178
Merida (clinker percentage)	%	81,69%	79,69%	77,69%	77,69%	77,69%	77,69%	77,69%	77,69%	77,69%	77,69%
Monterrey (cement prodcution)	tBC	950.133	993.839	1.040.549	1.084.252	1.125.454	1.164.845	1.205.614	1.247.811	1.291.484	1.336.686
Monterrey (clinker percentage)	%	79,50%	78,50%	77,50%	76,50%	76,50%	76,50%	76,50%	76,50%	76,50%	76,50%
Tamuín (cement prodcution)	tBC	1.601.733	1.675.413	1.754.157	1.827.831	1.897.289	1.963.694	2.032.423	2.103.558	2.177.183	2.253.384
Tamuín (clinker percentage)	%	78,20%	77,20%	76,20%	76,20%	76,20%	76,20%	76,20%	76,20%	76,20%	76,20%
Tepeaca (cement prodcution)	tBC	2.879.464	3.011.919	3.153.479	3.285.925	3.410.790	3.530.168	3.653.724	3.781.604	3.913.960	4.050.949
Tepeaca (clinker percentage)	%	73,16%	72,16%	71,16%	71,16%	71,16%	71,16%	71,16%	71,16%	71,16%	71,16%
Torreón (cement prodcution)	tBC	676.806	707.939	741.212	772.343	801.692	829.752	858.793	888.851	919.960	952.159
Torreón (clinker percentage)	%	82,50%	80,50%	79,00%	79,00%	79,00%	79,00%	79,00%	79,00%	79,00%	79,00%
Valles (cement prodcution)	tBC	28.856	30.184	31.602	32.929	34.181	35.377	36.615	37.897	39.223	40.596
Valles (clinker percentage)	%	91,83%	91,83%	91,83%	91,83%	91,83%	91,83%	91,83%	91,83%	91,83%	91,83%
Yaqui (cement prodcution)	tBC	1.147.581	1.200.370	1.256.787	1.309.572	1.359.336	1.406.913	1.456.155	1.507.120	1.559.870	1.614.465
Yaqui (clinker percentage)	%	78,28%	76,28%	75,28%	75,28%	75,28%	75,28%	75,28%	75,28%	75,28%	75,28%
Zapotiltic (cement prodcution)	tBC	1.344.773	1.406.633	1.472.744	1.534.600	1.592.915	1.648.667	1.706.370	1.766.093	1.827.906	1.891.883
Zapotiltic (clinker percentage)	%	69,80%	68,80%	67,80%	67,80%	67,80%	67,80%	67,80%	67,80%	67,80%	67,80%

Emission reductions calculations:

		Base year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Pblend CEMEX Mexico	%		74,75%	73,57%	72,50%	72,31%	72,31%	72,31%	72,31%	72,31%	72,31%	72,31%
BCy CEMEX Mexico	tonBC/año	12.316.522	12.891.082	13.484.071	14.117.823	14.710.771	15.269.781	15.804.223	16.357.371	16.929.879	17.522.424	18.135.709
Bblend,y	%	76,97%	76,97%	76,51%	76,05%	75,59%	75,13%	74,67%	74,21%	73,75%	73,28%	72,82%
Ablend,y	%	23,03%	23,03%	23,49%	23,95%	24,41%	24,87%	25,33%	25,79%	26,25%	26,72%	27,18%
BE clinker	tCO2/tClinker	0,883										
PE clinker	tCO2/tClinker		0,883	0,883	0,883	0,883	0,883	0,883	0,883	0,883	0,883	0,883
BE clinker conservative	tCO2/tClinker		0,883	0,883	0,883	0,883	0,883	0,883	0,883	0,883	0,883	0,883
BE_ele_ADD_BC	tCO2/tBC	0,028										
PE_ele_ADD_BC	tCO2/tBC		0,028	0,028	0,028	0,028	0,028	0,028	0,028	0,028	0,028	0,028
BE_ele_ADD_BC conservative	tCO2/tBC		0,028	0,028	0,028	0,028	0,028	0,028	0,028	0,028	0,028	0,028
BE_BC,y	tCO2e/tonBC	0,701	0,707	0,703	0,699	0,695	0,691	0,687	0,683	0,679	0,675	0,671
PE_BC,y	tCO2e/tonBC		0,688	0,677	0,668	0,666	0,666	0,666	0,666	0,666	0,666	0,666
Emission reductions												
Baseline emissions	tCO2		9.119.971	9.484.631	9.872.971	10.227.785	10.554.317	10.859.419	11.172.949	11.495.124	11.826.164	12.166.296
Project emissions	tCO2		8.867.078	9.134.359	9.430.914	9.801.812	10.174.281	10.530.381	10.898.944	11.280.407	11.675.222	12.083.854
Leakage emissions	tCO2		-3.401	-4.711	-5.946	-5.729	-5.111	-4.426	-3.685	-2.888	-2.030	-1.109
ERy Emission reductions	tCO2e/año		249.492	345.560	436.111	420.244	374.924	324.612	270.320	211.829	148.913	81.333
ERy Emission reductions (10 years)	2.863.338	tCO2e										

Project and Baseline Emission Factors[3]

Emission Factor	Clinker production	Cement production	BE_Fossil Fuel	BE grid clinker	BE Calcin clinker	BE grid Grinding	BE grid additives	BE clinker	BE_BC
Plant	Tn Clinker/año	Tn cemento/año	TnCO2/Tn Clinker	TnCO2/Tn Clinker	TnCO2/Tn Clinker	TnCO2/Tn BC	TnCO2/Tn BC	TnCO2/Tn Clinker	TnCO2/tBC
Atotonilco	1,092,791	1,334,948	0.33	0.047	0.525	0.033	0.00005	0.900	0.743
Barrientos	741,149	1,061,780	0.32	0.057	0.529	0.033	0.000	0.910	0.752
Campana	1,649,019	1,720,256	0.32	0.041	0.534	0.029	0.000	0.896	0.748
Ensenada	496,691	657,496	0.34	0.039	0.527	0.037	0.000	0.908	0.735
Guadalajara	736,705	976,681	0.29	0.055	0.520	0.060	0.000	0.861	0.685
Hidalgo	189,167	178,008	0.32	0.046	0.464	0.000	0.000	0.827	0.000
Huichapan	2,165,017	3,095,496	0.31	0.048	0.538	0.025	0.000	0.896	0.677
Mérida	647,647	795,581	0.33	0.043	0.533	0.025	0.000	0.909	0.821
Mty Gris	1,474,117	1,563,818	0.32	0.042	0.524	0.025	0.000	0.886	0.770
Taquín	1,295,075	1,802,271	0.29	0.040	0.523	0.024	0.000	0.853	0.732
Tepeaca	2,410,192	3,257,799	0.30	0.034	0.532	0.026	0.00012	0.865	0.669
Torreon	1,086,829	1,260,011	0.33	0.043	0.502	0.025	0.000	0.875	0.801
Valles Gris	86,718	90,673	0.42	0.060	0.536	0.027	0.000	1.019	0.962
Yaqui	1,076,789	1,365,880	0.29	0.042	0.523	0.024	0.000	0.858	0.727
Zapotiltic	1,457,701	1,818,654	0.33	0.037	0.525	0.025	0.000	0.896	0.690
Average/Total	16,605,607	20,979,352		0.043	0.527	0.028	0.000022	0.883	0.716

[3] Project emission factor has been estimated the same as the baseline emission factor. The project emission factor will be monitored.

Leakage: [4]

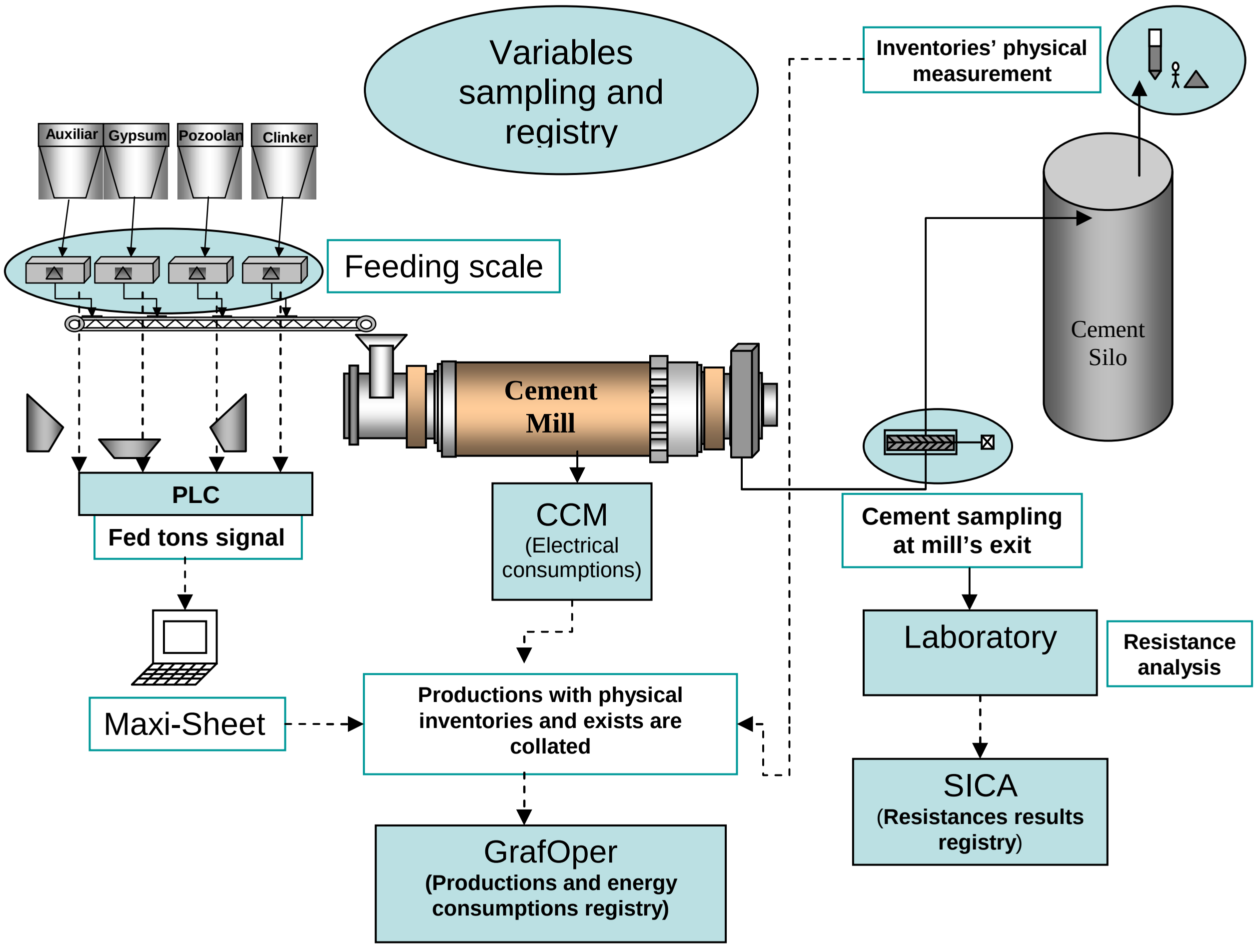
	Transport capacity	Trip distance	Transport type	Ladd_trans	TF_cons	TEF
	ton/veh	Km/veh		tCO2/ton add	kgfuel/km	kgCO2/kgfuel
Atotonilco	80,00	1,00	Truck	0,0000	0,41	3,21
Barrrientos	4.590,00	48,00	Train	0,0004	11,25	3,21
	80,00	1,00	Truck	0,0000	0,41	3,21
Campana	0,00	0,00	NA	0,0000	0,00	3,21
Ensenada	5.000,00	45,00	Ship	0,0003	10,00	3,21
	80,00	7,00	Truck	0,0001	0,41	3,21
Guadalajara	80,00	50,00	Truck	0,0008	0,41	3,21
	80,00	111,00	Truck	0,0018	0,41	3,21
Hidalgo	0,00	0,00	NA	0,0000	0,00	3,21
Huichapan	0,00	0,00	NA	0,0000	0,00	3,21
Merida	4.590,00	1.510,00	Train	0,0119	11,25	3,21
	80,00	2,00	Truck	0,0000	0,41	3,21
Monterrey	80,00	16,00	Truck	0,0003	0,41	3,21
Tamuín	0,00	0,00	NA	0,0000	0,00	3,21
Tepeaca	0,00	0,00	NA	0,0000	0,00	3,21
Torreón	0,00	0,00	NA	0,0000	0,00	3,21
Valles	0,00	0,00	NA	0,0000	0,00	3,21
Yaqui	0,00	0,00	NA	0,0000	0,00	3,21
Zapotiltic	0,00	0,00	NA	0,0000	0,00	3,21

[4] The maximum L_{add_trans} factor has been assumed to calculate leakage emissions as a conservative manner.

Annex 4

MONITORING INFORMATION

The following figure describes the necessary equipments to meter the variables defined in Section B.7.



Annex 5

ELECTRICITY EMISSION FACTOR

Total Fuel consumption:

2003: 1.608.190 TJ
2004: 1.537.745 TJ
2005: 1.597.605 TJ

	2003			
	Fuel share	Fuel consumption (TJ)	Carbon content (tC/TJ)	Emission CO_2 (tCO_2)
Fuel Oil	42,20%	678.656	21,1	52.505.366
Natural Gas	37,00%	595.030	15,3	33.381.200
Diesel	1,60%	25.731	20,2	1.905.812
Coal	19,20%	308.772	25,8	29.209.877
Total	100%	1.608.190		117.002.255

Fuel consumption per fuel type. Source: *Prospectiva del sector eléctrico 2004-2013 Gráfica 22 p.72*.

	2004			
	Fuel share	Fuel consumption (TJ)	Carbon content (tC/TJ)	Emission CO_2 (tCO_2)
Fuel Oil	41,10%	632.013	21,1	48.896.754
Natural Gas	42,60%	655.079	15,3	36.749.953
Diesel	1,00%	15.377	20,2	1.138.956
Coal	15,30%	235.275	25,8	22.257.014
Total	100%	1.537.745		109.042.677

Fuel consumption per fuel type. Source: *Prospectiva del sector eléctrico 2005-2014 Gráfico 30 p.82*.

	2005			
	Fuel share	Fuel consumption (TJ)	Carbon content (tC/TJ)	Emission CO_2 (tCO_2)
Fuel Oil	39,10%	624.664	21,1	48.328.137
Natural Gas	39,50%	631.054	15,3	35.402.128
Diesel	0,90%	14.378	20,2	1.064.963
Coal	20,50%	327.509	25,8	30.982.354
Total	100%	1.597.605		115.777.582

Fuel consumption per fuel type. Source: *Prospectiva del sector eléctrico 2006-2015 Gráfico 31 p.90*.

Generation by sources:

	2003	2004		2005	
	Power share	Power share	Power share	Annual Generation (GWh)	Power share	Annual Generation (GWh)
Dual	6,80%	3,80%	3,80%	13.842	6,50%	14.233
Combined cycle	27,00%	34,70%	34,70%	54.960	33,50%	73.355
Gas turbine	3,40%	1,30%	1,30%	6.921	0,60%	1.314
Coal	8,20%	8,60%	8,60%	16.692	8,40%	18.394
Internal	0,00%	0,30%	0,30%	0	0,40%	876
Nuclear	5,20%	4,40%	4,40%	10.585	4,90%	10.730
Standard Thermoelectric	36,60%	31,80%	31,80%	74.501	29,70%	65.034
Renewables (Hydro, Geo, Wind …)	12,80%	15,10%	15,10%	26.055	15,90%	34.816
Total	100%	100%	100%	203.555	100%	218.971

Generation by sources. Source: Sener. “*Prospectiva del sector eléctrico 2006-2015 Gráfico 30 p.89”; “Prospectiva del sector eléctrico 2005-2014 Gráfico 29 p.81”;* and *“Prospectiva del sector eléctrico 2004-2013 Gráfica 21 p.71”*

Total % under methodology		
2003	2004	2005
18,00%	19,50%	20,80%

Total generation in baseline (GWh)		
2003	2004	2005
166.915	167.950	173.206

Imports (GWh)		
2003	2004	2005
71,0	47,0	87,0

Imports. Source: Sener. “*Prospectiva del sector eléctrico 2006-2015 Cuadro 12 p.55”*

Baseline calculations:

- Operating Margin:

Operating Margin = total CO_2 emission / (total generation under baseline + imports)

Operating Margin 2003 = 117.002.255/ (166.915 + 71) = 700,7 tCO_2/GWh
Operating Margin 2004 = 109.042.677 / (167.950 + 47) = 649,1 tCO_2/GWh
Operating Margin 2005 = 115.777.582 / (173.206 + 87) = 668,1 tCO_2/GWh

OM = (700,7 * (166.915 + 71) + 649,3*(167.950 + 47) + 668,1* (173.206 + 87)) / ((161.048 + 531) + (166.915 + 71) + (173.206 + 87)) = **674,8 tCO_2/GWh**

- Build Margin:

Calculation of Build Margin:

Build Margin = (Fuel consumption (TJ) * Fuel emission factor (tCO_2/TJ)) / (Total annual generation of the last newest plants that comprise 20% of total generation (GWh_e))

Fuel consumption = 3,6 TJ/GWh_{therm} * (Annual Generation (GWh_e) / Efficiency (GWh_e/GWh_{therm}))

Fuel emission factor (tCO_2/TJ) = Carbon content (tC/TJ) * (44/12)

Plant name	Technology	Capacity (MW)	Plant factor (%)	Annual generation (GWh)	Efficiency (%)	Fuel type	Cumulative percentage (%)	Fuel consumption (TJ)
Additions 2005								
Hol Box	CI	0,8		3,18	47,61	DI	0,0%	24
La Laguna II	CC	498	80%	3.490	52,58	NG	1,6%	23.895
Rio Bravo IV	CC	500	57,10%	2.501	52,58	NG	2,7%	17.123
Botello	HID	9		61	90	na	2,8%	245
Baja California Sur I	CI	42,9	74,90%	281	47,61	NG	2,9%	2.128
Yécora	CI	0,7		2,11	47,61	NG	2,9%	16
Ixtaczoquitlán	HID	1,6		3,84	90	na	2,9%	15
Hermosillo	CC	93,3	8,40%	69	52,58	NG	2,9%	470
Additions 2004								
Chicoasén (Manuel Moreno Torres)	HID	900	26,40%	2.081	90	na	3,9%	8.326
Rio Bravo III PIE	CC	495	39,60%	1.717	52,58	NG	4,7%	11.757
El Sauz*	CC	128	60,70%	681	52,58	NG	5,0%	4.660
Tuxpan (Pdte. Adolfo López Mateos)	TG	163	63,50%	907	38,08	NG	5,4%	8.572
San Lorenzo Potencia	TG	266		214,03	38,08	NG	5,5%	2.023
Guerrero Negro II	CI	10,8		41,34	47,61	DI	5,5%	313
Additions 2003								
Los Azufres	Geo	79,8	85,30%	596	30	na	5,8%	7.155
Los Azufres	Geo	26,8	85,30%	200	30	na	5,9%	2.403
Tuxpan III y IV (PIE)	CC	983	63,50%	5.468	52,58	NG	8,4%	37.438
Altamira III y IV (PIE)	CC	1036	65,40%	5.935	52,58	NG	11,1%	40.637
Mexicali (PIE)	CC	489	51,10%	2.189	52,58	NG	12,1%	14.987
Transalta Campeche (PIE)	CC	252,4	80%	1.769	52,58	NG	12,9%	12.111
Naco Nogales	CC	258	80,50%	1.819	52,58	NG	13,7%	12.457

(PIE)								
Transalta Chihuahua III (PIE)	CC	259	48,50%	1.100	52,58	NG	14,2%	7.534
Additions 2002								
Hol Box	CI	0,8		3,180	47,61	DI	14,2%	24
Bajío	CC	591,7	80%	4.147	52,58	NG	16,1%	28.391
Altamira II	CC	495	71,10%	3.083	52,58	NG	17,5%	21.109
Río Bravo II	CC	495	52,60%	2.281	52,58	NG	18,6%	15.616
Monterrey III	CC	449	80%	3.147	52,58	NG	20,00%	21.544
Valle de Mexico	TG/CC	249,3	50%	1.092	52,58	NG	20,5%	7.476
El Sauz	TG/CC	129	60,70%	686	52,58	NG	20,8%	4.696
El Encino	TG	130,8	62,90%	721	38,08	NG	21,1%	6.813

New power plants installed. Source: Sener. *"Prospectiva del sector eléctrico 2005-2014 Cuadro 14 p.51; Prospectiva del sector eléctrico 2004-2013 Cuadro 9 p.44* and *Prospectiva del sector eléctrico 2003-2012 Cuadro 8 p.41* and *El Sector Energético en Mexico (Edición 2005) p. 82-85"*. Abbreviations: Hydro: hydropower plant; Geo: geothermal plant, CC: combined cycle plant, fuelled with natural gas, GT: Gas turbine, fuelled with natural gas. IC: Internal combustion.

BM factor **359,83** tCO_2/GWh

Emission factor ex-ante = 0,5*OM+ 0,5*BM = **517,31** tCO_2/GWh