

**CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL SCALE PROJECT ACTIVITIES (SSC-PDD)
Version 01 (21 January, 2003)**

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A. General description of project activity

A.1 Title of the project activity:

Tétouan wind farm project for Lafarge cement plant

A.2 Description of the project activity:

The project consists of the implementation of a 10.2 MW wind farm near the site of Tétouan II new cement plant.

Promoted by Lafarge Ciments company, the project aims at producing electricity from a renewable source, namely wind energy. The generated electricity, estimated at a net producible average of 38.1 GWh/year, will ensure about 50% of the new cement plant electricity demand. This renewable energy will partially substitute the electricity currently provided to the plant by the National Office of Electricity (ONE) through the national electricity grid.

Using a new and renewable local source of energy, the project will contribute to the reduction of GHG emissions, the decrease of the country's dependence vis-à-vis the importation of fossil fuels and will help create directly and indirectly new jobs. As such, the project activity is expected to contribute to the development of wind energy in Morocco and hence to help achieve the objectives of Morocco's national strategy for renewable energy development. Generally speaking, the project's contribution to Morocco's sustainable development can be summarized by the following benefits:

- ✓ Diversification of the national supply of energy;
- ✓ Local development of renewable energy use in an international context of high fossil energy prices ;
- ✓ Reduction of the country's imports in hard currency by the use of wind power instead of electricity mainly produced from imported coal, natural gas or oil products ;
- ✓ Reduction of GHG emissions in accordance with the objectives of the UNFCC ;
- ✓ Contribution to the development of national and foreign investments in the energy sector;
- ✓ Clean technology transfer and local capacity building in wind electricity generation and optimal use of wind energy in a heavy industry ;
- ✓ Creation of stable qualified jobs.

A.3 Project participants:

Host Country

Project promoter: Lafarge Ciments

Official contact for the CDM project activity: Mr. Saad TAZI

Director of Alternate Fuels and Raw Materials

Lafarge Maroc

Country of Annex 1

Lafarge S.A. – France

Mr. Bertrand GAILLARD

Deputy CO2 Project Manager

Information related to the project participants' contacts is presented in Annex 1.

A.4 Technical description of the project activity:

A.4.1 Location of the project activity:

A.4.1.1 Host country Party(ies): Morocco

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

A.4.1.3 City/Town/Community etc: Tétouan, Saddina Commune.

A.4.1.4 Detailed description of the physical location, including information allowing the unique identification of this project activity (*max one page*):

The wind farm is located on the site of the cement plant north west of the factory at an altitude of about 350 meters. The following figures 1 and 2 depict the location of the wind farm site and the positions of its 12 wind turbines. Figures 3 and 4 present photos of the wind farm and the adjacent cement plant.

In accordance with the recommendations of the project's technical feasibility study and the environmental impact assessment carried out during the first phase of the project, the twelve wind turbines are installed in two rows along a North Eastern crest overlooking the plant.

Table 1: Lambert coordinates of the of wind turbines locations

Wind Turbines	X	Y	Wind Turbines	X	Y
1	496 517	555 851	7	495 782	556 624
2	496 462	555 930	8	495 760	556 718
3	496 402	556 006	9	495 738	556 812
4	496 345	556 084	10	495 717	556 906
5	496 288	556 162	11	495 695	557 000
6	496 230	556 240	12	495 673	557 094

Figure 1: Location of the project activity

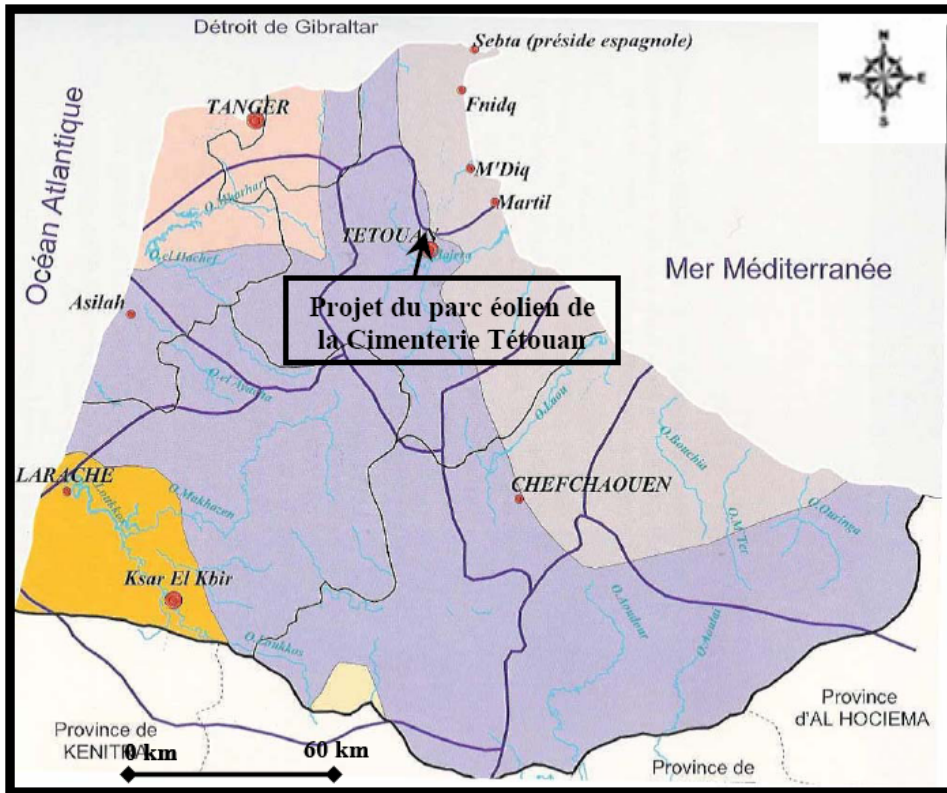


Figure 2: Location of the wind turbines

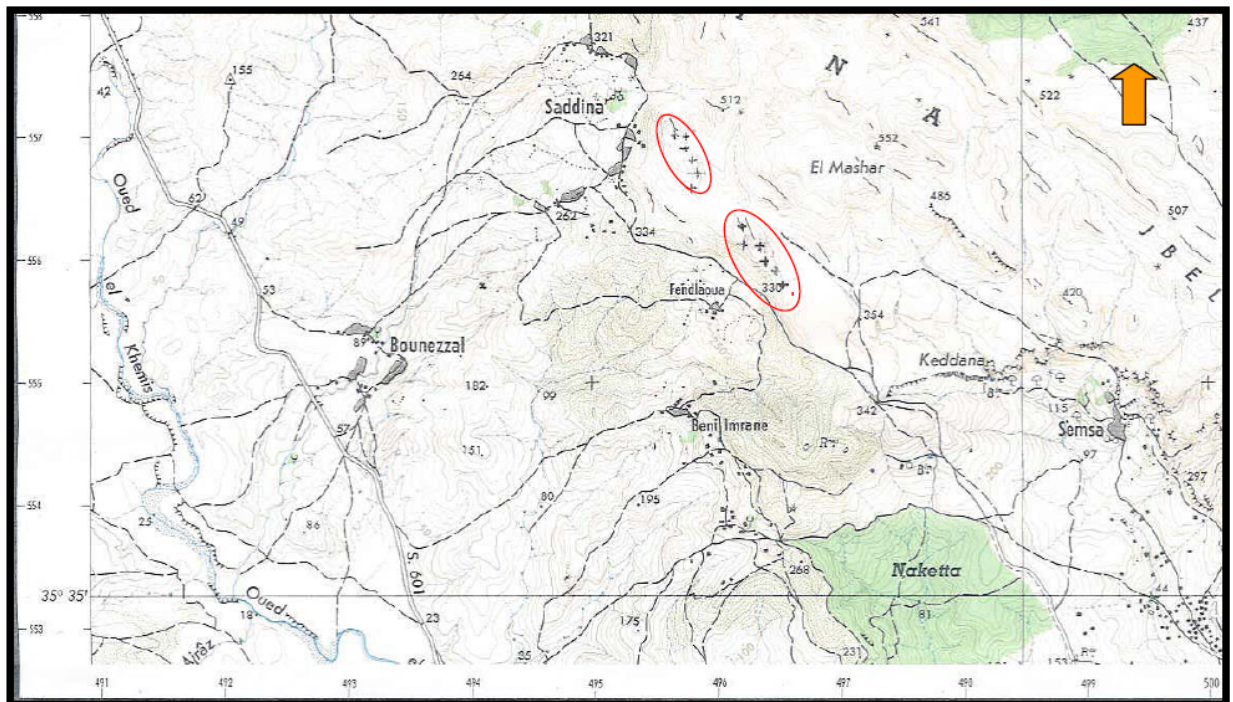


Figure 3: View of the wind park



Figure 4: Views of the Tétouan cement plant



A.4.2 Type and category(ies) and technology of project activity

According to the categories' list of CDM projects' activities of the appendix B (Annex II of the decision 21/CP.8, document FCCC/CP/2002/7/Add.3) on the simplified modalities and procedures for small-scale CDM activities, the Tétouan wind farm project relates to the category I-D:

Type 1 : Renewable Energy Projects

Category I.D : Production of renewable electricity for the grid

Tétouan Wind farm project has an installed nominal capacity of 10.2 MW below the 15 MW limit for CDM's small scale projects. It uses a renewable source of energy, namely wind energy to produce electricity. This technology is considered a clean technology since there is no gas emissions associated with the energy generation. Wind electricity generation is now accepted worldwide. It is an environment friendly alternative to the production of electricity from non-renewable sources such as fossils' fuels.

The Tétouan wind farm is equipped with twelve 850 kW wind turbines at 10 m/s using state of the art technology. They are manufactured by GAMESA EOLICA from Spain which was ranked fourth worldwide in 2003 in the design, manufacturing and installation of wind turbines. GAMESA wind turbines are widely used in Spain, France, Germany and other countries. The 850 kW GAMESA wind turbine has an excellent reliability record in other countries. Its rotor includes three blades of 25.3 m turning at a speed between 14.5 and 26.1 rpm. The tower is 45m high and weighs about 41 tons. Each wind turbine weighs about 80 tons. The generator is of an asynchronous type with coiled rotors. The 850 kW turbines are relatively large units that have not yet been used in Morocco. The largest wind generators installed so far in Morocco (ONE - Koudia Al Baida wind park) have a unit capacity of 600 kW.

The use of wind turbines for the power supply of a cement plant is a world first. The wind park will complement a new, highly energy efficient cement plant meeting the highest world environmental standards. The integrated system (wind park + cement plant) will be managed through new operational procedures (some parts of the equipment of the cement plant, like the main crusher which requests 4 MW of power, will be operated according to wind conditions) in order to optimize progressively the use of wind energy. As such, the project is expected to have an important worldwide impact on the utilization of wind energy in large industries with a global approach of energy conservation, environment protection and optimization of wind electricity utilization.

Project implementation includes a technology transfer during the construction phase through the subcontracting (about 33% of total investment) in Morocco of equipment manufacturing (electrical and electronic equipment for the connection of the wind turbines to the power system of the cement plant and the wind park supervision) and services (wind park civil works and installation). The project activity includes also a technology transfer through training sessions (supervision of the wind park from the cement plant control room, optimal management of the wind energy into the cement manufacturing process, training for wind park and control system maintenance).

The contract signed with the equipment supplier (Compagnie Eolienne du Vent) includes the maintenance of the wind farm during its first two operational years and the preliminary training of Lafarge Ciments technicians and engineers on other wind parks in Spain and France and on the Tétouan site during the construction, the start-up and the first two operational years.

The Moroccan approval process comprises a two step procedure: (i) official construction authorization and (ii) for CDM projects, the DNA approval.

The project activity has passed the following official approval steps:

- (i) Authorization of construction of the wind park under letter N°2004-04 from the President of the Saddina Commune on October 13, 2004 with the Governor's approval under N° 8735 of October 7, 2004.
- (ii) Approval of the wind farm CDM project by the DNA on 24 May 2005
- (iii) According to the Moroccan legislation, the implementation of an Environment Impact Assessment (EIA) is not required for this wind park; nevertheless, Lafarge Ciments decided to carry out an EIA in 2003-2004 to have a full understanding of the impact of this wind park on the environment and to take all necessary steps to mitigate its potential impact. This detailed EIA study of the wind park project was carried out by ADS Maroc, and reviewed and approved on 2nd May 2005 by the National Committee of Impact assessments studies¹.

The wind park is operational since 20 May 2005. Its official registration as CDM is expected at the beginning of the second semester of the year 2005.

A.4.3 Brief statement on how anthropogenic emissions of greenhouse gases (GHGs) by sources are to be reduced by the proposed CDM project activity:

In the absence of the project activity, the cement plant would be supplied for its entire electricity requirement by the National Office of Electricity (ONE). The electricity produced from the wind turbines will replace the electricity supplied by the ONE grid taken as reference for the baseline estimation.

By using the electricity generated from the wind park, the project activity eliminates the GHGs emissions which would have been emitted otherwise by the grid connected thermal power plants, had the project not taken place. The project's activity contributes as well to the reduction of local pollution associated with SO₂ and NO_x emissions of thermal power plants.

According to the baseline study presented in part E of this report, the wind farm will reduce, during its first 7 years' crediting period, the GHGs emissions of about 200 557 tons of equivalent CO₂, that is an average of 28 651 tons of CO₂ equivalent per year.

A.4.4 Public funding of the project activity:

The funding of the wind farm project is completely ensured by its promoter: Lafarge Ciments. The project activity does not involve any public funding.

A.4.5 Confirmation that the small-scale project activity is not a debundled component of a larger project activity:

Tétouan wind farm project is a stand alone project. The project activity is not a debundled component of a larger project.

¹ The EIA was presented at the « Comité Interministériel des études d'impact » on 2 May 2005 in the « Ministère de l'Aménagement du Territoire, de l'Eau et de l'Environnement ». At the end of the meeting, the committee has unanimously agreed that the Tétouan II wind park is acceptable from the point of view of environment. It was also agreed that an ornithological follow-up will be carried out after the start of the wind park.

B. Baseline methodology

B.1 Title and reference of the project category applicable to the project activity:

Title: ASM-1-D Renewable electricity generation for the grid

Reference: Appendix B of the simplified M&P for small scale CDM project activities: Indicative simplified baseline and monitoring methodologies for a selected small scale CDM project activity.

B.2 Project category applicable to the project activity:

The cement plant is currently supplied by the national electricity grid. The wind generated electricity will substitute about 50% of the energy currently supplied by ONE and hence replace an equivalent grid capacity. The wind farm is designed for the partial electricity supply of the cement plant, the ONE grid providing the balance. Nevertheless, at some times, during period of high winds and low electricity demand at the cement plant (maintenance periods, for example), the wind park will export energy to the ONE grid. Electricity flows can consequently occur on both directions. The wind park being permanently linked to the ONE grid, with possible energy exchange on the two directions, the ASM-1-D methodology was preferred as more relevant.

As an alternative option, the small scale methodology “I.A. Electricity Generation by the user” was considered but not retained as this methodology appears mainly designed for decentralized renewable electricity systems for households in isolated areas with no feedback to the main national grid.

B.3 Description of how the anthropogenic GHG emissions by sources are reduced below those that would have occurred in the absence of the proposed CDM project activity (*i.e. explanation of how and why this project is additional and therefore not identical with the baseline scenario*)

To demonstrate the additionality, we refer to the recommended procedure of Attachment A to Appendix B of the simplified M&P for small-scale CDM project activities, which requires to demonstrate that the project activity would not have occurred anyway due at least to one the following barriers: (a) investment barrier, (b) technological barrier, (c) barrier due to prevailing practice, (d) other barriers.

The most logical and common alternative for the project activity is the plant power supply directly from the national grid under a contract with the National Office of Electricity. Taking into account the nature of the industry and the necessity to guarantee a reliable and continuous supply of electricity, cement plants are always designed for a 100% grid supply. Once the wind farm is operational, the cement plant will use the generated renewable electricity as a partial substitute to the grid electricity.

Thus, in the absence of the project activity, the Tétouan Lafarge cement plant would have been supplied exclusively by the ONE national electricity grid, the electricity being mainly produced by thermal power stations operating with fossil fuels (coal, heavy fuel, or natural gas) associated with GHG emissions.

The baseline scenario for the project refers to the case where all the electricity demand of the cement plant is met by the national electricity grid.

The project scenario refers to the case where about half of the electricity demand of the cement plant is met by the wind park with no associated GHG emissions.

Actually, the implementation of this wind farm project integrated to a cement factory would not have been implemented anyway in the absence of the CDM, taking into account its specific risks and the need to overcome the following barriers (investment, technology and prevailing practices):

(a) Investment barrier

Compared to the standard solution of an electricity supply through the national grid, as implemented in near all world cement plants, Lafarge Ciments has selected a more complex power supply solution by integrating a wind park. Furthermore, the additional investment for this wind park (110 million MAD or about 10 million Euros) offers a low internal rate of return (about 10%) in comparison to the Internal Rates of Return (IRR) usually required by Lafarge Ciments for its other investment projects². This additional investment was consequently questioned and delayed by the Lafarge Ciments Executive Board as its IRR was considered too low taking into account its specific technical and financial risks, including a likely additional decrease of national grid electricity prices³ in line with the policy of the government to promote industry competitiveness and power sector liberalisation thus reducing further the IRR of the project.

From the beginning, the decision regarding the wind farm project's implementation has thus taken into account its CDM potential to generate Certified Emissions Reductions (CER). This choice is demonstrated by the fact that the project has been earmarked by Lafarge Ciments as CDM as early as October 2001 in a Project Information Note submitted to the Moroccan DNA.

This PIN was subsequently published in January 2002, in the official national CDM projects portfolio⁴ of the Moroccan DNA.

(b) Technological barrier

With respect to the technological risk, the electricity production of the wind farm is unstable depending on weather conditions and its actual annual output is uncertain depending on the validity of the simulation model and the reliability record of these wind turbines under local Moroccan conditions. The regular power supply of some plant workshops and equipment might be disturbed despite the ONE complex supply contract.

The option of optimizing the use of the wind energy, step by step, significantly complicates the technical and economic management of the plant's electricity supply. The continuous use of the fluctuating wind energy requires indeed some complex optimization procedures and adequate electricity distribution policy in the plant in accordance with the nature of the two existing supply sources: grid and wind farm. Likewise, the implementation of the project requires well-qualified electricians and energy managers.

² Background information on the details of these statements will be made available to the DOE.

³ ONE has decreased its average industrial electricity price by 40% in the last years. Electricity tariffs for industrial clients connected on 60 KV HV lines are available on the ONE site : www.one.org.ma . ONE electricity prices include a fixed charge per kVA and per year, and a variable kWh price according to the time of the day and the season. The excess wind electricity available from the wind park will be purchased by ONE at 50% of its selling price during peak hours and 40% during off-peak hours.

⁴ See the "Portfolio of Projects for Reducing Greenhouse Gas Emissions In Morocco" prepared with the support of UNDP/GEF to strengthen capacity in the Maghreb region regarding climate change - by:RAB Project 94/G31 with the assistance of SEI/APEX - January 2002 - This DNA document analyses the Lafarge Tétouan wind park CDM project submitted to DNA under a PIN format in October 2001.

With the implementation of the project, the promoter accepts the technological risks and challenge associated with the project activity, namely the additional constraints of a regular and continuous plant electricity demand management with an irregular supply source that fluctuates with the wind conditions.

The project alternative of 100% electricity supply from the grid is, on the contrary, fully reliable and has none of the technical risks mentioned above.

To illustrate this technological barrier, it is worth also highlighting an additional technological difficulty that Lafarge Maroc had just to face by switching part of its electricity supply to a wind park. Indeed, after the commissioning of the wind park, the cos phi of the grid on the 63 KV ONE side was lowered to a value below ONE limit contractual value. This cos phi deterioration has thus a direct impact on ONE electricity invoices. To address this constraint, Lafarge will compensate, at its own cost, the global 5.5 KV Lafarge electric installation by investing in multistage capacitors with automatic regulation. In addition, the ONE distributing company has requested that the cement plant invests in a network analyser to monitor electricity quality.

(c) Prevailing practices barrier

With regard to the widespread usual practices, it is worth mentioning that in Morocco the predominant practice of electricity supply for industrial plants is the ONE grid and that, currently, there is no industrial plant directly supplied by wind renewable energy. In fact, the project is a world first.

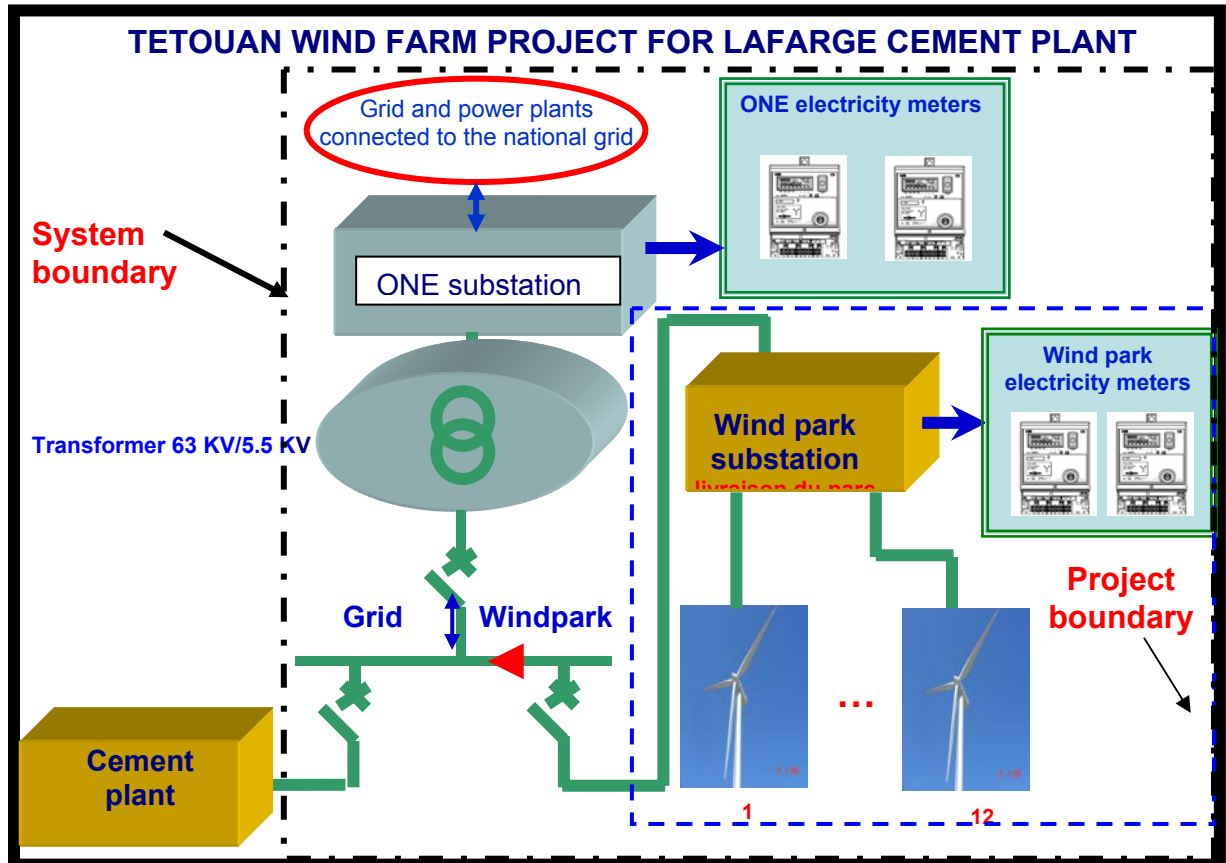
With the implementation of the project, Tétouan cement plant will be the first cement plant in the world to be directly supplied by wind renewable energy. This confirms the innovative aspect of the project and the degree of technological risk associated with it (especially since operating wind mills is quite a different task in comparison to Lafarge usual activities, namely cement manufacturing).

It is also worth mentioning that as a project of renewable electricity supply of an industrial factory; the project will play a pioneer role in the field of renewable energy in Morocco. In case of success, it will have a greater impact on the development of wind electricity for industrial uses. The benefits expected from the CDM will help compensate for the risks taken by the project's promoter.

B.4 Description of the project boundary for the project activity:

In accordance with the indications of the project activity approved methodology (AMS-I-D Production of renewable electricity for the grid; Appendix B of the simplified M&P for small scale CDM project activities: Indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity), the project boundary is restricted to the wind farm site, while the system boundary encompasses the wind farm, the national interconnected grid and all the power plants physically connected to the national electricity grid.

The following exhibit highlights the respective boundaries of the project and of the system.



B.5 Details of the baseline and its development:

B.5.1 Specification of the baseline for the proposed project activity

Taking into account the project's category 1-D and in accordance with the approved methodology AMS-I-D for the project category; the so called "consolidated" methodology is being applied. It is estimated by means of an average of "Approximate Operating Margin" and "Build Margin" based on the data from 2002-2004 which will be fixed *ex-ante* for the first crediting period.

Since the equipment associated with the project activity is new, leakage will not be considered in the evaluation of the emissions' reductions.

B.5.2 Date of completion of the baseline study

The baseline study has been completed on 15/01/2005.

B.5.3 Name of the person/entity determining the baseline:

Abdelmourhit Lahbabi, Ph.D.
Administrateur Délégué
ADS Maroc
4 Avenue Bin Al Widane, N° 6, Agdal
10 000 Rabat, Maroc.
Tel: 212-37-68 10 11 or 212-37-68 10 12
Fax: 212-37-68 13
www.adsmaroc.org.ma
E-mail: alahbabi@menara.ma

C. Duration of the project activity and crediting period

C.1 Duration of the project activity:

C.1.1 Starting date of the project activity:

20 May 2005

C.1.2 Expected operational lifetime of the project activity:

The expected operational lifetime of the project activity is 25 years

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

A period of 21 years, over three periods of seven renewable years, was chosen for the crediting period.

C.2.1 Renewable crediting period

C.2.1.1 Starting date of the first crediting period

The start date of the first crediting period: 1st October 2005

C.2.1.2 Length of the first crediting period

Duration of the first crediting period: 7 years

C.2.2 Fixed crediting period

Not applicable

C.2.2.1 Starting date
Not applicable

C.2.2.2 Length
Not applicable

D. Monitoring methodology and plan

D.1 Name and reference of approved methodology applied to the project activity:

The monitoring methodology applied is the one recommended in << Appendix B of the simplified M&P for small scale CDM project activities: Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity-I-D Renewable electricity generation for a grid >> stated as follows: “*monitoring shall consist of metering the electricity generated by the renewable technology*”

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

According to the baseline study, the key parameter to the emissions’ reductions evaluation is the energy generated by the wind farm. The recommended monitoring methodology is based on a specific and continuous measure of the net electricity produced by the wind farm.

Highly accurate electricity meters will be used to monitor the net energy produced by the wind farm. The main electricity meter will be duplicated to check data reliability and avoid gaps in data monitoring in case of meter failure. It will be located at the electricity sub-station of the wind farm, measuring the net electricity delivered to the plant or to the grid (during plant shutdowns). The measurement data will be processed and stored electronically in a computer system with regular backup copy on a digital basis complemented by printed versions of the monthly production records. The monitoring equipment will be initially maintained by the wind park supplier during two years. Subsequently, the maintenance of this monitoring equipment will be done by Lafarge itself or given to a local subcontractor.

The monitoring structure consist in a staff familiar with computers and data treatment, taking into account the fact that the staff of the cement plant is already using most sophisticated computing equipment for the permanent conduct and supervision of this new cement plant. Staff members are designated for data collection and management and monthly monitoring reports will be established. The responsible entity for monitoring is Lafarge Tétouan plant management.

The monitoring procedure will include, in particular: (i) staff organisation with job descriptions, (ii) instructions for data transfer and record handling protocols, and (iii) calibration checking procedures for the measuring equipment. An internal audit procedure will ensure the quality control and will check the reliability and security of the monitoring. Following these audits, corrective actions will be decided, if necessary. All the data will be archived until two years after the end of the crediting period.

The wind park is operated under permanent remote control with visualisation of all key parameters on electronic control panels. The engineers/technicians who supervise 24 hours a day the cement plant process will monitor also the wind park. In addition, an electrician and a mechanic have been recruited for the wind park on a full time basis.

Note : Apart from the direct employment generated by the monitoring and maintenance of the wind park it is worth to state that the wind park construction has created employment for 51 persons working on the site during 7 months and indirect employment in Moroccan enterprises for manufacturing of the subcontracted part of the wind farm (about 30% of the investment). Major wind park maintenance activities will also generate employment in the country.

D.3 Data to be monitored:

ID number	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	For how long is archived data to be kept?	Comment
E	Electrical energy	Electrical meters	MWh	m	Continuous	100%	Electronic and paper	The data will be archived until two years after the end of the crediting period.	Measures will be consolidated per month and per year.
F	Emission factor	ONE	Teq CO ₂ /MWh	c	At the beginning of each crediting period	100%	Electronic and paper	The data will be archived until two years after the end of the crediting period.	Data calculated and registered at the beginning of each of the three posting periods (3 x 7years). Factor evaluation based on the values of OM and BM officially communicated by ONE national power company.

D.4 Name of person/entity determining the monitoring methodology:

The monitoring method was defined by the management of the Tétouan cement plant with the advice of ADS Maroc.

E. Calculation of GHG emission reductions by sources

E.1 Formulae used:

E.1.1 Selected formulae as provided in appendix B:

The formulae used for the baseline GHG emissions is given in Annex B, category I-D projects, paragraph 7 of AMS-I-D.

E.1.2 Description of formulae when not provided in appendix B:

Not applicable

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary:

Not applicable

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities

Not applicable

E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the project activity emissions:

Not applicable

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHG's in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities:

Not applicable

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

Not applicable

E.2 Table providing values obtained when applying formulae above:

According to the referenced formulae, the baseline emissions is calculated by multiplying the net electricity generated by the wind park (in MWh) by the grid emissions factor expressed in Eq tCO₂/MWh. The latter being calculated as the average of << Approximate Operating Margin >> and of << Build Margin >>.

The “approximate operating margin” is defined in Appendix B as “the weighed average emissions (in kgCO₂equ/kWh) of all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation.” And the “build margin” is defined as the weighed average

emissions (in kgCO₂equ/kWh) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of most recent 20% of existing plants or the 5 most recent plants”

The emissions factors applied, as communicated officially by the National Office of Electricity (cf. letter of ONE dated 5 January 2005 presented in Annex 3) are summarized in the following table.

Emission factors of the ONE national grid (2002-2003-2004)

Designation	Emission Factor in tCO₂ by MWh
<< Operating Margin >> (OM)	
2002	0.737
2003	0.741
2004	0.750
Average OM in 2002-2004	0.743
<< Build Margin >> (BM) 2004	0.761
<< Combined Margins >> (Average OM & BM)	0.752

The build margin of the year 2004, has been computed as the weighted average emissions of recent capacity additions to the grid. The five more recent power plants were used namely : Ahmed EL Hansali (hydro), Ait Messoud (hydro); Dakhla (gas turbine, diesel), Torres (wind) and Jorf Lasfar (coal). It should be noted that these power plants represent also the most recent plants producing 20% of the total electricity generated.

Based on wind data measurements at the site, the production of the turbines is evaluated at an average of 39.7 GWh/year. This value is estimated from the gross theoretical producible of 46.8 GWh/year taking into account the expected losses (17.9%) due to dragging, altitude, relief and maintenance periods. This conservative estimate takes also into account the operational experience of the nearby ONE 50 MW wind park (Koudia Al Baida) operated by the supplier of this wind park. Additional losses of 2 to 4% are usually observed in the transformers and cables. In a conservative approach, a 4% additional reduction for these losses was also taken. Based on these assumptions, the expected net energy to be generated by the Tétouan wind farm is 38.1 GWh/year.

In accordance with the recommended calculation formulae, the baseline emissions, expressed in tCO₂ eq., is evaluated by the multiplication of the net production of the farm namely 38.1 GWh/year by the average factor of emission resulting from the consolidated method, evaluated at 0.752 tCO₂/MWh, that is 28 651 tCO₂ eq/year.

The baseline emissions during the first 7 years crediting period is then estimated at 200 557 tCO₂ eq.

The following table summarizes the computations' results.

Designation	Unit	Value
Net production of the wind farm	MWh/year	38 100
Grid average emission factor	tCO ₂ /MWh	0.752
Emissions associated with the project activity	tCO ₂ /year	0
Baseline emissions	tCO ₂ /year	28 651
Emissions' annual reduction	tCO ₂ eq/year	28 651
Duration of first crediting period	Years	7
Total reduction during the first crediting period	tCO ₂ eq	200 557

F. Environmental impacts

F.1 If required by the host Party, documentation on the analysis of the environmental impacts of the project activity: (if applicable, please provide a short summary and attach documentation)

Despite the fact that the Moroccan law N°12-03 on EIA does not apply to the project's activity, an Environment Impact Assessment (EIA) study was undertaken for the project activity.

Tétouan wind farm project was the subject of a comprehensive study on the potential impacts of its activity on environment, comprising the following stages:

- Detailed presentation of the project;
- Analysis of the legal and statutory framework;
- Characterization campaign of the site initial state;
- Ornithological survey;
- Project activity analysis;
- Impact assessment of the project activity on environment;
- Definition of impacts' mitigation measures;
- Elaboration of an environmental monitoring plan and
- Definition of the follow up procedures.

Within the framework of the project EIA, carried out according to international practices and standards, the project benefited from a landscape study for the minimisation of turbines' visual impact. The project also benefited from an ornithological study comprising three campaigns of avifauna observations: premarital migration, nesters and post marital migration.

Once achieved, these studies enabled to analyze the initial state, describe the project activity and justify the choice of the wind farm settlement site, identify and evaluate impacts that are associated with its activity not only with regard to the environment but with respect to the region's socioeconomic activities as well.

Three main potential impacts on the local environment and neighbouring populations, were identified and analysed: i) noise ii) impact on migrating birds and iii) potential risk of mechanical failure of the turbine blades.

Taking these impacts into consideration, a recommendation was made to change⁵ the initial project site in order to insure a minimal distance of at least 200 m from the nearest inhabited house⁶. Subsequently, a new site which complies with this safety distance limit was retained for the project.

As for the migrating birds, given the project site location and the results of the avifauna campaign, the impact was considered not significant. However, a monitoring plan for noise and for local and migrating avifauna was recommended by the study.

The Environment Impact Assessment concludes that with the recommended mitigation measures, the project will not present any significant impact on the natural environment and will contribute to the socioeconomic development of the region and the reductions of the GHG emissions.

G. Stakeholders comments

G.1 Brief description of the process by which comments by local stakeholders have been invited and compiled:

The comprehensive procedure adopted by Lafarge Ciments to inform all concerned stakeholders about the project's activity, its environmental and socioeconomic impacts and to discuss and compile their comments and suggestions is described hereafter.

The development of this wind park included a consultation of stakeholders at all steps of the project:

- Several initial consultation meetings held with the elected representatives and the President of the Commune. In each meeting, Lafarge Ciments presented the project activity, the results of the EIA study and discussed the questions raised by the participants.
- A meeting with the Governor of the Northern Region to present the project

Following this preliminary dialogue , an official authorization to build the wind farm was delivered by the President of Saddina Commune on October 13, 2004 under N°2004-04 following the Governor's approval under N° 8735 of October 7, 2004.

⁵ This late change of location to avoid any potential noise inconvenience to the local population was decided by Lafarge Ciments despite its extra investment cost (about 10%) and its negative impact on the annual electricity output of the wind farm (lower wind conditions on the second site).

⁶ As there is no safety distance limit imposed in Morocco, the EU norm of 200 m was considered for the project.

Meetings with other stakeholders were subsequently held during project preparation:

- Meeting with the Prime Minister.
- Meetings with ONE management to discuss technical and contractual matters attached to this innovative project.
- Information meeting at national level on February 9, 2005 in presence of representatives of the Moroccan administration of environment and energy, the Designated National Authority, executives of the power utility, national and international journalists and representatives of foreign embassies on the occasion of a partnership agreement between Lafarge Ciments and the French Fund for Worldwide Environment.

Brief description of the procedure followed for consultations with the stakeholders:

Two additional events were organized to achieve an in-depth dialogue with the stakeholders at local and national levels:

A - Consultation of the local community (residents) living close to the wind park (18 May 2005)

A half day dialogue with local residents and representatives of the Commune of Saddina and members of the association (NGO) Wifak, was additionally organised on 18th May 2005, by two independent environment consultants who implemented the wind park impact environment study. The consultation, carried out in association with Lafarge Ciments, included : (i) transport of the residents and their representatives to the 50 MW ONE Koudia Al Baida wind park to assess on site the noise level of a larger wind park, (ii) questions and answers by participants, (iii) joint lunch and (iv) return to Saddina Commune.

The objective of the dialogue was to discuss the issues of the local residents, register their questions and reserves before the start of the wind park and to provide them with detailed answers. The main questions raised by the local stakeholders were the following:

- impact of the wind park on the health of the population
- impact of the wind park on the cattle
- security of the wind park
- noise generated by the wind park and its consequences on the population
- benefits generated by the project (possibility to accelerate the electrification of the village)

At the end of the day, after having visited this major wind park (ONE) in operation and received detailed answers to each question, the representatives of the local residents expressed their conviction on the absence of impact of the wind park on the local environment and the health of the population and gave their full commitment to the project.

A detailed minute of this dialogue, prepared by ADS Maroc, is available from Lafarge Ciments

B –Final consultation of stakeholders at regional level on 31 May 2005

Lafarge Ciments organized, in close dialogue with the Moroccan DNA, an enlarged stakeholder meeting on 31 May 2005 in Tétouan where the following entities were invited : Ministry of Energy, ONE, Department of Energy and Mines in Tétouan, Ministry of Urban Planning Water and Environment, Agency for the Development of the Northern Provinces, Governor of Tétouan (Secretary General, Head of Circle, Caid), Counsel of the Region; Communal Counsel of Saddina, representatives of the local collectivities, local representative of ONE, University/Faculty of Tétouan, NGO of Tétouan (Dr. Bakkali),

local press, Water and Forests Department, ONEP, Division of the Wilaya's Rural Affairs and Delegation of Habitat and Urban Planning.

The stakeholder meeting, which was attended by more than twenty participants (local authorities, elected representatives of local communities, public officers of local administrations, and university senior staff), was prepared and coordinated by Mr Saad Tazi, Director in Lafarge Maroc, Mr Ayoub Azami, Manager of the Tétouan cement plant, Mrs Samira Khamlichi, Head of the Climate Change Unit, representing the Moroccan DNA and Mr Abdelmourhit Lahbabi, Managing Director, ADS Maroc.

The agenda of the meeting was the following: (i) presentation of Lafarge and Tétouan cement plant, (ii) presentation of the wind park project, (iii) presentation of the results of the impact assessment study, (iv) presentation of national CDM activities and carbon market development by the DNA, followed by (v) dialogue session with the participants and a (vi) lunch.

G.2 Summary of the comments received:

The summary of discussions, comments and questions is presented hereafter⁷ :

- *“The elected representatives and local authorities recognize the importance of this project and its economic impact on the region and the efforts and resources used by Lafarge to protect the environment. They acknowledge also the spirit of dialogue and cooperation which was established by the management of the Tétouan cement plant and are grateful to Lafarge for its social investments already implemented (tar road, enlargement of the school, health center).*
- *The participants also recognized the efforts of Lafarge in implementing the recommendations of the impact environment study and, in particular, the shifting of the wind park site far from households to reduce noise level and ensure the security of residents.*
- *The elected representatives and local authorities express their wish that the dialogue and joint actions for local development of the resident community be continued. They invite Lafarge to consider a support to the following development projects :*
 - *Ongoing regional forestation project*
 - *Generating set installation to run a pump for water supply of Dchiriyine village*
 - *Electric supply of the population not grid connected and/or subsidies for electric bills of poorest families from nearby villages (douars)*
- *There is a need to improve the local air quality by reduction of dust originating from nearby quarries exploited by other enterprises than Lafarge.”*

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

Answers of Lafarge and organizers of the stakeholders' dialogue:

- *“The management of Lafarge is pleased by the dialogue initiated and the ongoing cooperation with the elected representatives and local authorities and reassert their commitment to continue this cooperation by contributing to the social development of nearby communities in line with their policy for sustainable development;*
- *The management of Lafarge underlines the scale of the financial efforts committed to environment protection (15% of the total investment of the cement plant) and reminded that the*

⁷ The minutes of this stakeholder consultation on 31/05/05 is available in French from Lafarge.

shifting of the wind park site has delayed its implementation by one year and has generated a 10 millions Dh extra investment.

- *The management of Lafarge has also recalled the social development projects in which Lafarge participated and invited the residents to formulate requests for new specific social projects taking into account that, for the time being, the budget is not yet a constraint, the quality and viability of proposed projects being the key issue.*
- *Regarding the question of the authorities and residents on the possibility to provide electricity to residents living nearby the cement plant, Lafarge will provide an answer on its feasibility taking into account the fact that the ONE departments have raised legal constraints.*
- *Regarding dust generation by quarries, it was underlined that they mostly come from nearby quarries (independent from Lafarge) whose exploitations do not meet modern standards. Lafarge is very concerned taking into account the fact that it has itself invested heavily in high efficiency dust filters. Lafarge propose its technical assistance to a committee bringing together quarry owners, elected representatives and local authorities in their efforts to reach better environment standards by reducing dust generation.*
- *Lafarge has committed itself in front of the interministerial committee on impact environment studies to implement the recommendations of the EIA study and in particular will organize an ornithological campaign study after one year of operation of the wind park.*
- *At the end of the meeting, the participants and Lafarge management reiterated their common will and ambition to increase their collaboration to maximise the economic and social benefits of the project on the local community.”*

Annex 1

CONTACT INFORMATION FOR PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding was used for the project.

Annex 3

Calculation of the Build Margin and Operating Margin and the CEF for the years 2002-2003-2004

Translation of the Letter of ONE dated 5 January 2005 related to the Build Margin and Operating Margin and the calculation of the CEF for the years 2002-2003-2004

Subject : Demand of references for CO2 emissions – ref 248-2004 DT/L

“ Following your referenced letter, I inform you that that the methodology of calculation of the baseline, which was finally adopted for the presentation of the Essaouira wind park (60 MW) CDM project is the one denominated “consolidated” by the Executive Committee of the CDM.

This new methodology which calculates a common carbon emission factor for large renewable energy projects (>15 MW) can also be applied to small projects.

A short presentation of this methodology with necessary data for its application is presented in the attached note.

....

Signed by : Ahmed NAKHOUCHE , Managing Director, Office National de l'Electricité

Presentation & Emission factors

Short presentation of the methodology

The methodology, named “consolidated”, takes into account the production and fuel consumption of all ONE power plants under operation. These plants are classified into two categories : the oldest and the most recent.

For the oldest power plants, an average emission factor “Operating Margin” is calculated for the last three years.

For the most recent power plants, only the year 2004 was taken into account to calculate the average emission factor, the “Build Margin”

In addition, a zero emission CO₂ emission factor is attributed to the balance of exchanges with Spain and Algeria.

At last, the baseline is defined by the “Combined Margin” which is an average of the two above emission factors.

Emission factors of the ONE national grid (2002-2003-2004)

<i>Designation</i>	<i>Emission Factor in tCO₂ by MWh</i>
<i><< Operating Margin >> (OM)</i>	
<i>2002</i>	<i>0.737</i>
<i>2003</i>	<i>0.741</i>
<i>2004</i>	<i>0.750</i>
<i>Average OM in 2002-2004</i>	<i>0.743</i>
<i><< Build Margin >> (BM) 2004</i>	<i>0.761</i>
<i><< Combined Margins >> (Average OM & BM)</i>	<i>0.752</i>