PROJECT DESIGN DOCUMENT FORM
FOR SMALL-SCALE CDM PROJECT ACTIVITIES (F-CDM-SSC-PDD)
Version 04.1

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	Integrated fuel switching Project at Industrial Facilities in Gafsa region – Tunisia
Version number of the PDD	1.05
Completion date of the PDD	11/09/2012
Project participant(s)	Société Tunisienne d'Electricité et de Gaz (STEG)
Host Party(ies)	Tunisia
Sectoral scope(s) and selected methodology(ies)	01 1 – Energy industries (renewable - / non-renewable sources) AMS.III.B: "Switching Fossil Fuels" (Version 16)
Estimated amount of annual average GHG emission reductions	36,521 tCO2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

>>The project activity aims at reducing GHG emissions by installing new gas connection infrastructure allowing the two Chemical Companies: "Compagnie des Phosphates de Gafsa-CPG" and "Groupe Chimique Tunisien-GCT", to switch from the use of fuel oil to natural gas. The two companies are under the same public industrial group, thus the project is not a bundled project activity.

The Compressing Station of Feriana is the first upstream gas-gate located in Tunisia of the gas pipeline[1] that transports the natural gas from Algeria to Italy. The connection of the Gafsa region will necessitate the construction of 90 km of 20" gas transmission pipe to connect the Compressing Station of Feriana to the industrial facilities involved in the project activity.

The project activity will involve the implementation of the following equipment:

a/ Gas distribution pipes:

- 44 km of 8" gas distribution pipes to connect three industrial units of the CPG Company (Oum Laareyes, Mdhilla and Metlaoui)
- 6 km of 4" gas distribution pipe to connect two industrial units of the CPG Company and GCT Company based in Mdhilla.

b/ Gas delivery stations and connection pipes:

These involve Extra-Muros STEG Gas delivery stations and Extra-Muros connections to the industrial units.

c/ Connection pipes and pressure relief stations:

Intra-Muros connections are needed in the five targeted industrial facilities to conduct the gas to the gate stations equipped with pressure relief devices to be installed, where gas pressure is to be transformed from 76 bars to 4 bars.

d/ Conversion of consuming devices:

Relieved gas is to be directed to the consuming devices (dryers and steam generators). As a part of the project activity, burners should be converted into the use of natural gas instead of Fuel oil at the five targeted industrial facilities

[1] The Trans-med gas pipeline, connecting Algeria to Italia and crossing Tunisia was implemented in 1984.

Three companies are involved in this fuel switching CDM project:

- Société Tunisienne d'Electricité et de Gaz (STEG): is the Public Utility in charge of Power and Gas Production, Transmission and Distribution. In this project activity, STEG installs and operates the Gas transmission and distribution network.
- Compagnie des Phosphates de Gafsa (CPG), a State company specialized on production of phosphates
- Groupe Chimique Tunisien (GCT), a State company specialized on production of chemical products (Triple Superphosphate, Phosphoric acid, Nitric Acid, etc.).

Table 1 shows the industrial facilities involved in the project:

Table 1: Companies and industrial utilities involved in the project

Company	Sector	Location of the Facility	Production	Equipment(s) targeted by the fuel switch
STEG	Power Utility	Gas provider (transport and distribution) to the 5 targeted facilities	NA	NA
Compagnie des Phosphates de Gafsa (CPG)	Chemical Industry	1. Oum Laarayes	Phosphate	Dryer
		2. Mdhilla Zone L	Phosphate	Dryer
		3. Mdhilla Laverie	Phosphate	Dryer
		4. Metlaoui	Phosphate	Dryer
Groupe Chimique Tunisien (GCT)	Chemical Industry	5. Mdhilla	Triple Super Phosphate (TSP)	Dryer and Boiler

For this project activity, the three partners have nominated STEG to be the Project Participant on their behalf. A formal agreement describing the conditions of their collaboration as well as the shares of the CERs' revenues is finalised and will be signed by the three partners in October 2011

STEG is a State owned company, operating for more than 50 years in gas transportation and distribution and having the monopoly of gas distribution in Tunisia. STEG distributes Gas to residential, tertiary and industrial users, in many regions in Tunisia.

Gafsa region is not connected to the gas grid due to the long distance of that region to the main gas network, and to the limited fuel switching opportunities (absence of power plants, and limited industrial and residential consumption).

Currently, the industrial facilities consume residual fuel oil to generate heat for drying phases, as well as for steam generation requirements. The annual residual fuel consumption that is being substituted by natural gas is shown in table 2.

Table 2: Historical fuel consumption of the targeted utilities (Tj)

	Plant	2008	2009	2010	Average 3 years
Compagnie des Phosphates de Gafsa (CPG)	1. Oum Laarayes	245	106	186	**179**
	2. Mdhilla Zone L	184	173	187	**181**
	3. Mdhilla Laverie	194	174	237	**202**
	4. Metlaoui	320	90	206	**206**
	TOTAL CPG	**942**	**544**	**815**	**767**
Groupe Chimique de Tunisie (GCT)	5. Mdhilla	1 170	995	1 113	**1 093**
TOTAL TWO COMPANIES		***2 112***	***1 539***	***1 928***	***1 860***

***Source**: [Calculations tables.xls (Sheet: Utilities)]*

The average total residual fuel oil consumption of the industrial facilities participating in this project activity is 1,860 TJ/year, 99% of which are used in dryers and 1% in boilers. More detailed figures are included in Annex 3 of the current PDD.

The project activity registration under the CDM will allow the industries to minimize the economic disadvantages resulting from the high upfront Investment costs implied by the fuel switching. Apart from the investment associated with the gas pipelines, the project will also involve investments associated with the gas relief stations as well as with the conversion of the consuming devices of the 5 utilities into natural gas use.

The proposed project activity will result in GHG emission reductions by 365,207 tCO2e over a 10-year crediting period. In addition to GHGs emission reductions, the switching of fuel oil to natural gas will also generate various benefits:

- Continuous supply of energy.
- Less vehicular traffic due to elimination of fuel delivery trucks and therefore less risk of accidents as well as elimination of emissions from these vehicles.
- Improvement of air quality due to less emission of local pollutants. By switching from fuel oil to natural gas, which does not contain sulphur, the Project activity will reduce emissions of SOx and NOx as well as particulate matters.
- Improvement of labour and health conditions of the employees involved in the five facilities.
- Lower potential sources of risks resulting from fuel-storage facilities.
- Lower dirtiness and corrosion at the plants.
- Lower maintenance of the consuming equipments (Dryers and Boilers).
- Promotion of clean energy use in the local area. At present, while natural gas is used as a household fuel in some large cities in Tunisia, it is not being supplied to many smaller cities such as Gafsa due to the lack of infrastructure. However, once the gas network is established in the region, the natural gas will also supply households and other sectors (small industries, services, etc.), resulting in improved energy services for various professions and better quality of life for locals.

A.2. Location of project activity
A.2.1. Host Party(ies)
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Tunisia

A.2.2. Region/State/Province etc.
>>
Gafsa

A.2.3. City/Town/Community etc.
>>
Oum Laareyes, Mdhilla and Metlaoui

A.2.4. Physical/ Geographical location
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The project is located in the South-East of Tunisia. A new 20"-Gas pipeline will link the TRANSMED Algeria-Italy gas Pipeline –at the Feriana compressing station- to the region of Gafsa where the project is located. Gafsa Governorate is located at around 80 km-south from Feriana.

Figure 1: Location of the project

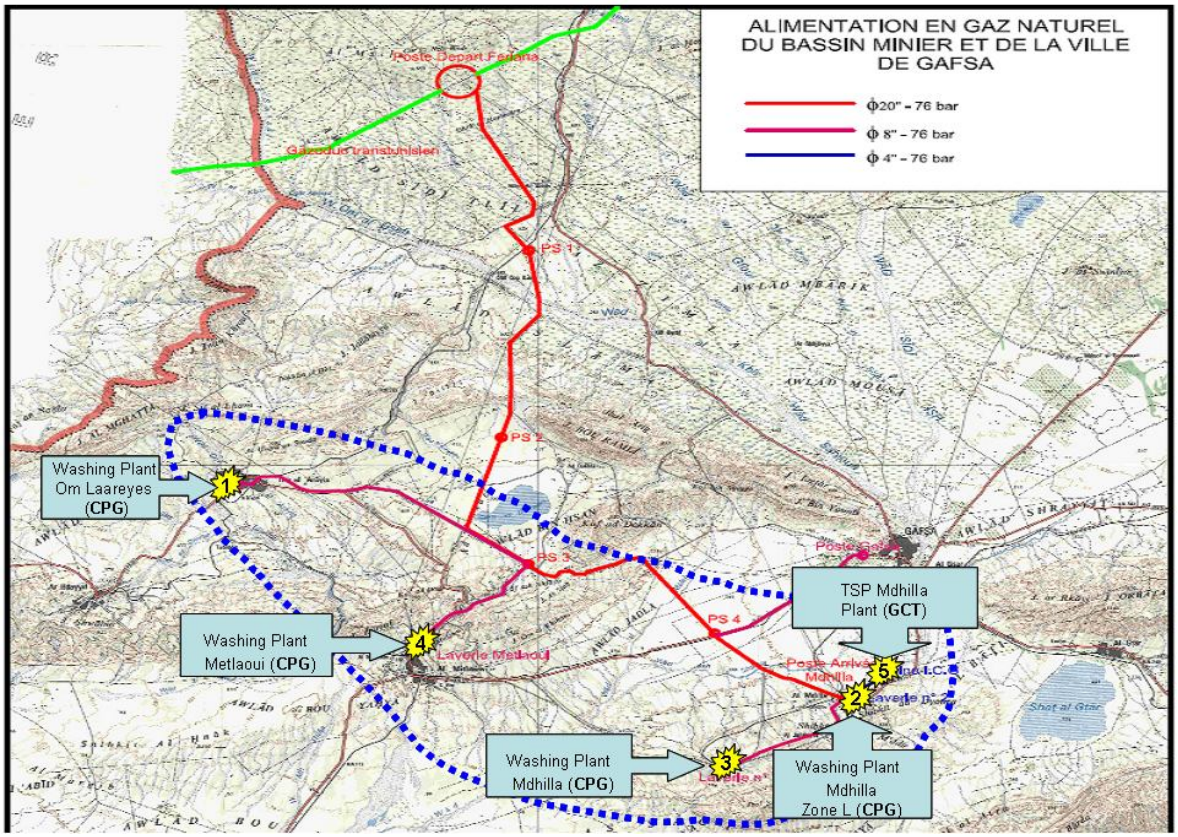

Figure 2: Facilities targeted by the project activity

A.3. Technologies and/or measures

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The project activity is a fuel switching project. It falls under the Small Scale project activity. Emission reduction estimates based on the last historical three year (2008-2010) are below the limits of 60,000 tCO2e per year. Estimates over a longer period (2006-2010) are also systematically below such limit.

In accordance with Appendix B of the simplified modalities and procedures for small-scale clean development mechanism project activities ("SSC M&P"), the Project activity falls under the following type and category:

Type III: Other project activities
Category B: Switching fossil fuels (Version 16)
Sectoral Scope 1 – Energy industries (renewable - / non-renewable sources)

The existing Dryers and Boiler of the 5 facilities will remain the same and will maintain the same capacity in the project activity as it was under baseline circumstances. Under the project activity, all equipment will be converted into the use of natural gas, together with some other minor modifications.

Table 3: Specifications of Burners to be converted into gas (baseline and project activity situation)

	Factory	Equipment	Brand	Model	Type	Burning capacity Min-Max (Nm3/hr)	Efficiency (%)
Compagnie des Phosphates de Gafsa (CPG)	1. Oum Laarayes	Dryer	Pillard	Comburex	Multitubes	2500	
	2. Mdhilla Zone L	Dryer	Pillard	Comburex	Rotating, monotube		
	3. Mdhilla Laverie	Dryer	Pillard	Comburex	Multitubes		
	4. Metlaoui	Dryer	Pillard	Comburex	Rotating, monotube	1400 - 2000	

	Factory	Equipment	Brand	Model	Type	Burning capacity Min-Max (th/hr)	Efficiency (%)
Groupe Chimique Tunisien (GCT)	5. Mdhilla	Dryer	Pillard	MCRC67	Horizontal cylindrical with mechanical spray	20 000	95%

Table 4: Specifications of Boilers to be converted into gas (baseline and project activity situation)

	Factory	Equipment	Brand/ Model	Capacity (T/h)	Pressure (bars)	Steam temperature	Efficiency (%)
Groupe Chimique Tunisien	5. Mdhilla	Boiler	SG 4203	25	40	400°C	85,7%

The five facilities will be supplied with Algerian gas that is provided from the Algero-Italian TRANSMED gas Pipeline. The average composition of the natural gas over the period 2008-2010 is described in the table 5:

Table 5: Typical composition of Algerian natural gas (average 2008-2010)

	% Volume
Methane (CH4)	87,96%
Ethan (C2H6)	7,07%
Propane (C3H8)	1,29%
Iso Butane (i-C4H10)	0,13%
Normal Butane (n-C4H10)	0,19%
Iso Pentane (i-C5H12)	0,03%
Normal Pentane (i-C5H12)	0,03%
Hex and Hydro Sup (C6H14)	0,04%
Anhydr. Carbon (CO2)	1,15%
Nitrogen (N2)	2,02%
Helium (H2)	0,09%
TOTAL	**100,00%**

***Source**: [Calculations tables.xls (Sheet: Carbon Alg Gas)]*

A.4. Parties and project participants

Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Tunisia (host)	Public entity A: Société Tunisienne d'Electricité et de Gaz (STEG)	No

A.5. Public funding of project activity

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Project financing will not involve ODA or public funding from Annex I Parties

A.6. Debundling for project activity

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According to "Compendium of guidance on the debundling for SSC project activities (Annex 27, EB36)", a proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

(a) With the same project participants;
(b) In the same project category and technology/measure; and
(c) Registered within the previous 2 years; and
(d) Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

The project proponent confirms that it has not registered any small scale CDM project or applied for registration another small scale CDM project activity in the same project category and technology/measure within 1 km of the project boundary. Hence the above criteria of debundling cases are not applicable for this CDM project.

SECTION B. Application of selected approved baseline and monitoring methodology

B.1. Reference of methodology

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AMS Type III – "Other Project Activity"
Category B: Switching fossil fuels (Version 16)

B.2. Project activity eligibility

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This project activity involves industrial facilities that intend to reduce GHG emissions by switching the existing captive heat generators/boilers in 5 plants pertaining to CPG and GCT from fuel oil use to natural gas. The project activity will result in emission reductions below 60,000 tons of CO2 equivalent annually, thus it falls under the small-scale criteria of the AMS.III.B; which will apply for the current project activity.

Methodology AMS.III.B comprises fossil fuel switching in industrial, residential, commercial, institutional or electricity generation applications1 (e.g., fuel switch from fuel oil to natural gas in an existing captive electricity generation or replacement of a fuel oil boiler by a natural gas boiler).

AMS III.B/Version 16 also states that Fuel switching may result in energy efficiency improvements. If the project activity primarily aims at reducing emissions through fuel switching, it falls into this methodology. If fuel switching is part of a project activity focussed primarily on energy efficiency, the project activity falls under a Type II methodology.

The current project activity involves the conversion of existing installations to allow for the use of gas in the Dryers/Boiler. Although Fuel switching may change efficiency as well, however, the main purpose of the Project activity is fuel switching, not energy efficiency. The Project activity does not involve any renewable biomass, biofuel or renewable energy use in the project scenario. Also, in any year of the crediting period, emissions reductions resulting from the Project activity will not exceed 60 ktCO2-equivalents annually. Therefore the Project activity falls under the category III.B Switching fossil fuels.

The project activity will neither involve capacity additions, nor will it involve the replacement of existing equipment. It will rather involve conversion of existing devices into the use of gas.

AMS.III.B is applicable to project activities where it is possible to directly measure and record the energy use/output (e.g., heat and electricity) and consumption (e.g., fossil fuel) within the project boundaries. This project activity involves fuel switching to generate heat and steam for on-site captive use. Heat and Steam generated, as well as fossil fuel consumption are duly measured and recorded by the facilities involved within the project boundaries. Three-year Historical information (2008-2010) related to these parameters is presented in Annex 3 (Baseline Information).

Regulations in Tunisia do not constrain the facilities from using either energy sources; neither have they required the use of low carbon energy sources. Furthermore, the facilities are not connected to the natural gas network; hence the energy selected by the facilities up to now is the most cost-effective among available ones, i.e. fuel oil.

B.3. Project boundary

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As per the baseline methodology III.B, the project boundary is the physical, geographical site where the switching of energy source takes place. It includes all installations, processes or

equipment affected by the switching. Therefore the project boundary encompasses the gas connection as well as the Dryers/Boilers in the 5 industrials plants where the fuel switching occurs.

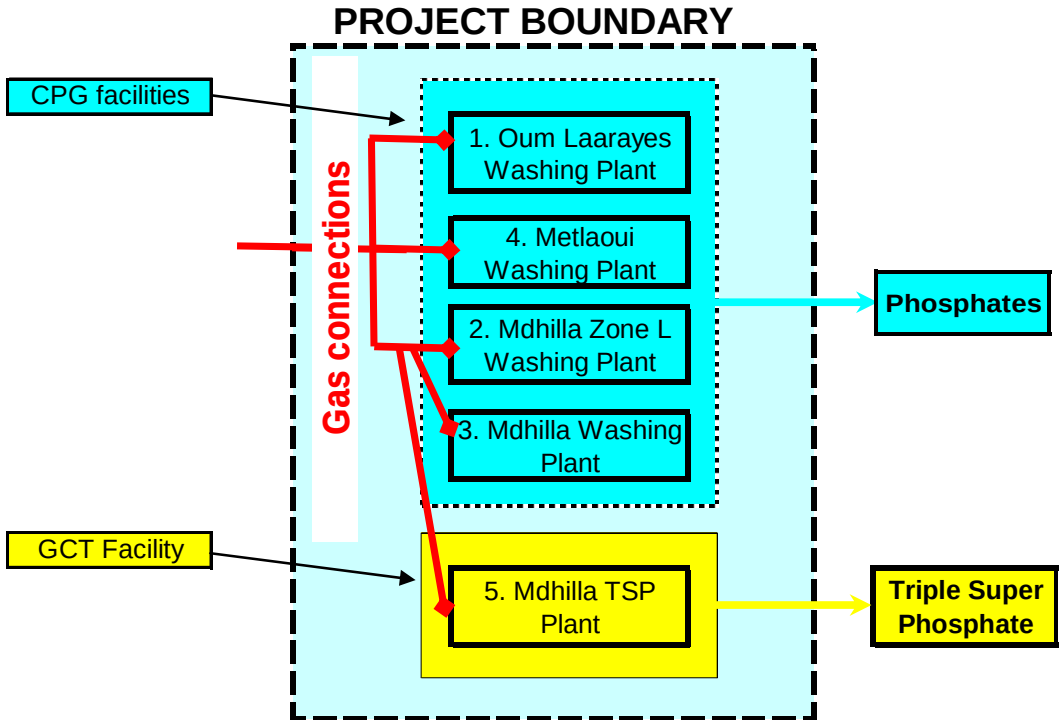

Figure 3: Boundary of the project activity

B.4. Establishment and description of baseline scenario

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The project includes building a dedicated pipeline to connect the 5 plants, and the conversion of equipment to allow for the use of natural gas.

In the absence of the Project activity, the Companies CPG and GCT would continue to use fuel oil for heat and steam generation as they used to do for decades.[2]

As per AMS.III.B, in case of existing facilities historical information on the use of fossil fuels and the plant output (e.g. heat or electricity) in the baseline captive energy generation plant from at least three years prior to project implementation shall be used in the baseline calculations. In the case of the project activity, detailed data records for the years 2008 to 2010 will be used.

As required by the methodology, the emission baseline should be the current emissions of the 5 targeted facilities of CPG and GCT.

For the 5 facilities, detailed records of fuel oil consumption and heat output (heat)/steam) in the baseline captive energy generation plants for the years 2008, 2009 and 2010 are available. These historical data will be used for the determination of the baseline situation. The emission baseline is expressed as emissions per unit of output.

[2] CPG is a public Company originally created in 1885. GCT is a group of public chemical companies, which first entity (SIAPE) was created in 1952.

Emission reductions will be determined using actual data which are to be monitored. The key variables and parameters used to calculate the emission reductions are as follows:

Table 7: Key variables and parameters(1)

Variables & Parameters	Data Source
Quantity of natural gas combusted in the Dryers/Boilers (after the project implementation)	CPG and GCT
Quantity of Heat/Steam generated (before and after the project implementation)	CPG and GCT
Quantity of Phosphate and TSP produced by CPG and GCT respectively	CPG and GCT
Net calorific value of the natural gas	STEG
Net calorific value of fuel oil	Official NCV(2)
CO2 emission factor of the natural gas	STEG(3)
CO2 emission factor of the fuel oil	IPCC default Value

(1) Details of each parameter are described in section B.6.2 and B.7.1.
(2) Tunisian Decree, 1987.
(3) As provided by STEG.

B.5. Demonstration of additionality

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As mentioned in the Section B.2, there are no regulations requiring the use of natural gas or any other fuels. Furthermore, there are not gas connections to these utilities, and the closest possible gas connection is located at Feriana, at about 80 km-North from Gafsa region. Therefore the fuel oil is being used for decades to meet heat and steam generation needs as it is the most cost-effective energy available in the region. Hence, the current baseline situation, i.e. using fuel, is the most economically attractive option for the project proponents. The CDM revenue will therefore represent an important leveraging factor for the implementation of this fuel switching project.

According to Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities,[3] as supplemented by the "Non-binding best practice examples to demonstrate additionality of SSc project activities, [4] project participants shall provide an explanation to show that the project would not have occurred anyway due to at least one of the following barriers:

(a) **Investment barrier**: a financially more viable alternative to the project activity would have led to higher emissions;

(b) **Access-to-finance barrier**: the project activity could not access appropriate capital without consideration of the CDM revenues;

(c) **Technological barrier:** a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;

(d) **Barrier due to prevailing practice**: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;

[3] Annex 6 of EB7 Report.
[4] EB35, Annex 34.

(e) **Other barriers** such as institutional barriers or limited information, managerial resources, organizational capacity, or capacity to absorb new technologies.

Taking the project circumstances into account, the most relevant barrier that have prevented this project activity from being implemented without the contribution of CDM lies with the Investment Barrier.

Investment barrier:

All the five facilities have been using Fuel Oil for decades.[5] Until beginning of year 2004, there was no rationale at all for the two consuming companies (CPG and GCT) to even plan for switching from fuel oil to natural gas given the comparative domestic pricing advantage to fuel oil. Since the energy markets turmoil in 2004, this advantage has completely disappeared, as Tunisian Authorities has significantly increased fuel oil prices while applying lower increase in the domestic prices of natural gas, up to end of year 2007. From the strategic point of view, The Government of Tunisia has decided to promote the use of natural gas, since the natural gas was either produced domestically, or supplied by the Algero-italian pipeline as a fee in nature for crossing the Tunisian Territory.

Although domestic prices of natural gas became comparatively more advantageous than fuel oil prices, this advantage could only benefit to regions connected to the natural gas network. Elsewhere, Fuel oil has continued to be utilized intensively, including Gafsa region which was at about 100 km from the closest gas connection. For that region, fuel switching option would have required a significant investment amount for the construction of the natural gas infrastructure and extension pipelines to the factories, in addition to pressure relief devices, internal pipelines and conversion of the consuming devices into gas. This was historically a major barrier to the connection of the region to the natural gas network.

The Aggregate upfront investment cost including all components involved within the project boundaries, was estimated at 39.7 million dinars[6] (see details in table A.4.5 in Annex 3).
These high investment costs were the main barriers for switching to natural gas, apart from the institutional factors whereby various Parties were to be involved in the decision (the STEG, the gas provider, and CPG and GCT the major gas consumers in the region).

Apart from the Investment barrier, there are also no guarantees that the pricing advantage for gas would remain in the future. The current pricing policy advantaging natural gas is closely linked to international and national circumstances, and these might vary in the future; putting back advantage to fuel oil. As per illustration, recent comparative prices in Tunisia (see table A.4.6 in Annex 3) has shown a lower increase for Fuel prices (16% per year from 1 Dec. 2007 to 16 Jan. 2009), than for natural gas (+32% per year for High Pressure Tariff-1; that is relevant for CPG).

Furthermore, prices of High Pressure Tariff-2 gas have even increased by 54% per year within the same period, putting natural gas prices at only 5% lower that Fuel oil prices. This tariff would be for instance applicable to GCT, hence bringing fuel switching to natural gas into question for such industrial entity.

[5] For CPG, Mdhilla and Oum Laarayes plants were established in 1978. Regarding Mdhilla Washing plant Zone L and Metlaoui, they were operated in 1980. For GCT, the Mdhilla TSP Plant was established in 1980. All these 5 plants have been using fuel oil since these dates up to now.

[6] About US$ 29 million; of which 73% would be paid by STEG.

Overall, economic analysis of the fuel switching project for both CPG and GCT do not clearly indicate either of the two alternatives (fuel or gas) would be the most economically attractive, given the uncertain energy market developments by mid and longer terms. Investing in such fuel switching project is a challenging and risky decision; which CDM Revenues would contribute to soften.

Economic performance of the project activity is not fully satisfactory for STEG either, given the high upfront cost associated with the primary and secondary natural gas infrastructure.[7] STEG is already involved in an ambitious development program of the natural gas network over the whole territory, but it is also concerned with the cost-effectiveness of any new connection, and its program is currently focusing on regions with good fuel switching potentials and projects presenting attractive economic performances. This is far from being the case for Gafsa region.

Financial analyses were undertaken for the two consuming companies (CPG and GCT) as they are the most concerned parties with the fuel switching; hence they have a determining role in triggering the project implementation as a whole. The IRR was selected as the relevant economic indicator to analyse the project activity. Table 8 below shows the financial analysis for the project activity, at the time where the decision to implement the project was definitely made (mid-2009), without and with CDM financing.

Table 8: Key Summary of project financial analysis without and with CDM financing)

	Without CDM	With CDM
IRR	8.6%	15.9%

As shown, the project IRR without CDM financing (8.6%) is too low, and hence doesn't encourage for a favourable decision to the project activity. Any unfavourable variation in the determining factors of the project (e.g. energy market developments) will put the project into question. Attractiveness of the project would improve significantly thanks to the CERs revenues, with an IRR jumping to 15.9%; thus providing for a +7.3% bonus in IRR. This would greatly alleviate the economic risks associated with the project.

To confirm whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions, sensitivity analysis was conducted by varying the following parameters:

- Sensitivity Analysis 1: Initial Investment costs is 10% lower or higher than expected
- Sensitivity Analysis 2: Savings in energy expenses (in dinars) is 10% lower or higher than expected

Table 9: Sensitivity analysis - Impact of variations in critical assumptions on project IRR Without CDM consideration

Variations	-10%	-5%	0%	+5%	+10%
Investment cost	10.8%	9.7%	8.6%	7.6%	6.7%
Savings in energy expenses	6.5%	7.5%	8.6%	9.6%	10.6%

NB: resulting IRR are shown in the shaded cells

[7] Besides the above mentioned 39.7 million dinars of investment cost, STEG will also bear the cost of the primary gas pipeline; which would amount to 27 million dinars (US$ 20 millions).

The sensitivity analysis shows a limited improvement in IRR when considering 10% variations in investment costs and in Savings in energy expenses. The most favourable situation lies with the reduction of the Investment cost by 10%, which results in an IRR amounting to 10.8%. This IRR is still too low to allow for a favourable decision to the fuel switching project, given the uncertainties related to the future gas/Fuel oil ratio.

On the other hand, increasing the savings of energy expenses[8] (in dinars) by 10% would only improve IRR from 8.6% to 10.6%%. However, the eventual perspectives for more favourable scenarios would not balance the risks of a reduction in Gas/Fuel oil ratio, which would question the decision to switch.

In fact, table 9 also shows a decrease in IRR resulting from a 10% increase in investment cost (IRR=6.7%) or a 10% decrease in the savings of energy expenses (IRR=6.5%). This confirms the magnitude of the economic risks associated with the project activity.

Therefore, the project is unlikely to be implemented unless a voluntary initiative is decided by the Tunisian Authorities, together with a strong partnership between STEG and the major energy consuming companies (CPG and GCT). CDM consideration would improve the economic performance of the project activity, and thus help alleviating the financial risks of the project.

In fact, even with the expected revenues from the CERs sales, the Project Activity still remains economically weak, and far to be considered in the priority agenda of the STEG, CPG and GCT. However, the three partners put significant non-monetary values on the project being a CDM Project Activity, as it provides a serious illustration of the willingness of Tunisia to contribute to combat Climate change.

Prior Consideration of CDM

After seriously considering the benefits of CDM in the decision to proceed with the Project Activity, the project partners took continuing and real actions to secure CDM Status in parallel to its implementation. As to ensure CDM eligibility, CDM actions were initiated

Tables 10 and 11 below show the timeline of the Actions taken for the project implementation as well as the CDM Registration:

[8] May result from a variation of the gas/fuel price-ratio for example.

Table 10: Timeline for the project implementation

Date	Action taken	Remark
June 2007	Presentation of the project request to Ministry of Industry, Energy and Medium and Small Enterprises	Letter STEG N°21 (1st June 2007) sent to the Minister
November 2007	Signature of the convention n° G15D0009 between STEG and CPG, and n° G15D 0028 between STEG and GCT	Agreement between the three partners regarding the project
December 2008	International bidding process to select a company that will implement the project	Call for International Bidding n° 2008 G 0043
July 2009	Review of the technical offers	Report and conclusions of the Higher Committee regarding the technical offers
July 2009	National bidding process to undertake the Environmental Impact Assessment	Call for National Bidding n° 2009 G 0002
September 2009	Review of the commercial offers Final Decision related to the selection of the enterprise that will implement the works	Report and conclusions of the Higher Committee regarding the commercial offers
23 November 2009	Signature of the contract with the selected company to undertake the project realization	The signature of the contract launches the official launching of the works
1st December 2009	Starting of the work	Official notification to start the works, from STEG to the contracted company
January 2010	Signature of the contract with the selected company to undertake the Environmental Impact Assessment	
February 2010	Achievement of the financing package for the project	Signature of a financing agreement between STEG and Islamic Development Bank (IDB)

Table 11: Timeline for CDM Registration

Date	Action taken	Remark
October 2006	Consultation initiated by GTZ to identify a national consultant for the PIN elaboration	
15 November 2006	Signature of the contract with the consultant to elaborate the PIN	APEX Conseil was selected as the consultant Company to elaborate the PIN a
5 February 2007	Letter sent by STEG to CPG/GCT regarding the vis-à-vis persons to follow up on CDM actions	
17 February 2007	Submission of the Draft PIN to STEG and other partners	
November 2007	Submission of the final version of PIN	
17 January 2008	Approval of the PIN by DNA Tunisia	
September 2008	Consultations made by GTZ to select a consultant to elaborate the PDD	
19 November 2008	Signature of the contract with the Consultant to elaborate the PDD	APEX Conseil selected to elaborate the PDD
18 November 2008	Launching meeting of the PDD Elaboration	
December 2008-June 2009	Several meetings and exchange of information regarding the project	
3 July 2009	Meeting Review of the project and PDD preparation progress	
30 September 2009	Version 1.01 of Draft PDD finalized	
24 December 2009	Version 1.02 of Draft PDD finalized and distributed to partners for review	
8 February 2010	Prior Consideration Form sent to UNFCCC	
18 August 2011	Version 1.03 of PDD distributed to partners for final review	
3 October 2011	Version 1.04 of PDD submitted to DNA for Approval	
11 September 2012	Version 1.05 of PDD submitted to Validation	Reflect AMS.III.B Version 16 and VVS Track PDD format

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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Baseline emissions

The emission baseline is the current emissions (resulting from fuel oil combustion) of the facilities involved in the project activity expressed as emissions per unit of output. Baseline emissions are determined as follows:

$$BE_y = \sum_i EF_{i,BSL} * Q_{i,y}$$

Where:

BE_y Baseline emissions in the project activity in year y (tCO_2e)

$EF_{i,BSL}$ Emission factor for the baseline situation in heaters/boilers of Facility i per Net energy output (tCO_2/TJ)

$Q_{i,y}$ Net energy output (heat/steam) generated by heaters/boiler of Facility i (TJ)

The emission factor in the baseline situation ($EF_{i,BSL}$) is the coefficient for the fossil fuel used in the baseline - for each Facility i - expressed as emissions per unit of output (kg CO_2e/Tj). $EF_{i,BSL}$ is calculated for each facility i as follows:

$$EF_{i,BSL} = (FC_{i,BSL,y} * NCV_{BSL} * EF_{BSL}) / Q_{BSL,i}$$

Where:

$FC_{i, BSL,y}$ Quantity of fuel oil combusted in Facility *i* during the year *y* in the baseline situation (ton)

NCV_{BSL} Net calorific value of fuel oil (TJ/ton)

EF_{BSL} CO_2 emission factor of fuel oil (tCO_2/TJ)

$Q_{BSL,i}$ Net energy (heat/steam) generated by heaters/boilers of Facility i in baseline situation during the corresponding period of time (2008-2010) for which the total fuel consumption was taken (TJ)

For quantity of fuel oil combusted, the most recent 3 years data (2008-2009 and 2010) prior to project implementation are used.

Project emissions

Based on AMS.III.B/Version 16, Project emissions result from the use of the natural gas that will replace fuel oil as a result of the fuel switching operation. Project emissions are determined as follows:

$$PE_y = \sum FC_{project,i,y} * EF_{NG,CO2} * NCV_{NG,y}$$

where,

PE_y Project emissions in the project activity in year y (tCO_2e)

$FC_{project,i,y}$ Quantity of Natural Gas combusted in heaters/boilers of Facility i during the year y (Nm^3)

$EF_{NG,CO2}$ CO_2 emission factor of the Natural Gas combusted in the project heaters/boilers (tCO_2/TJ)

$NCV_{NG,y}$ Net calorific value of the Natural Gas combusted in year y (TJ/Nm^3)

Leakage

As stated by AMS III.B – Version 16, no leakage calculation is required.

Emission reductions

The emission reduction achieved by the project activity is calculated as the difference between the baseline emissions and the project emissions.
$ER_y = BE_y - PE_y$

Where,

ER_y Emissions reductions of the project activity during the year y (tCO2e)

BE_y Baseline emissions during the year y (tCO2e)

PE_y Project emissions during the year y (tCO2e)

B.6.2. Data and parameters fixed ex ante

Data / Parameter:	**$FC_{i,BSL}$**
Unit:	ton
Description:	Quantity of fuel oil combusted in the baseline situation in each Facility i involved in the project activity
Source of data:	Official data provided by each of the Facility i
Value(s) applied:	Total annual value applied: 45,367 tons (Average of years 2008-2009-2010)
Choice of data or Measurement methods and procedures	3 years data prior to the project implementation (2008-2009-2010) are used. The detailed data are presented in annex 3.
Purpose of Data	Basis for calculation of the baseline situation
Additional comment:	

Data / Parameter:	**NCV_{BSL}**
Unit:	TJ/ton
Description:	Net calorific value of fuel oil that would have combusted in the absence of the project activity
Source of data:	Official Calorific Value of Fuel Oil in Tunisia
Value(s) applied:	40.997×10^{-3}

Choice of data or Measurement methods and procedures	The official national data is used. The value is taken from the Decree 1987 related to the Calorific Values of fuels in Tunisia
Purpose of Data	Calculation of the calorific value of Fuel oil consumption
Additional comment:	

Data / Parameter:	$\mathbf{EF}_{BSL}$
Unit:	tCO_2/TJ
Description:	CO_2 emission factor of fuel oil
Source of data:	IPCC default value
Value(s) applied:	77.4
Choice of data or Measurement methods and procedures	Since national data is not available for fuel oil, default value from 2006 IPCC Guidelines for National greenhouse Gas Inventories is used (Table 1.4)
Purpose of Data	Calculation of the Baseline Emissions
Additional comment:	

Data / Parameter:	$\mathbf{Q}_{Steam,BSL}$
Unit:	TJ
Description:	Net energy (Steam) generated by boilers in baseline situation
Source of data:	GCT
Value(s) applied:	17.2 Tj (Average years 2008-2009-2010)
Choice of data or Measurement methods and procedures:	The most recent 3 years data prior to the project implementation (2008-2009-2010) are used. Detailed data are presented in annex 3.
Purpose of Data	This parameter is used to calculate the emission factor in the baseline situation expressed as emissions per unit of output (kg CO2e/Tj).
Additional comment:	

Data / Parameter:	$\varepsilon_{boiler,baseline}$
Unit:	%
Description:	Energy Efficiency of boiler in the baseline situation
Source of data:	Calculated using the measured data
Value(s) applied:	90.03 (average years 2008-2009-2010)

Choice of data or Measurement methods and procedures:	The energy efficiency of the boiler was calculated by the direct method (dividing the net heat generation by the energy content of the fired fuel). The most recent 3 years data available (2008-2009-2010) at the time of the PDD preparation were used.
Purpose of Data	Used to calculate the baseline quantity of Energy that would be used for Steam Process in the absence of the project activity (starting from the Useful energy Need in the project situation)
Additional comment:	

Data / Parameter:	$\mathbf{Q}_{\text{Heat,BSL}}$
Unit:	TJ
Description:	Net energy (Heat) generated by heaters in baseline situation
Source of data:	CPG and GCT
Value(s) applied:	Average data for years 2008-2009-2010) 1. Oum Laarayes (CPG) : 130.5 Tj 2. Mdhilla Zone L (CPG) : 132.3 Tj 3. Mdhilla Laverie (CPG) : 147.1 Tj 4. Metlaoui (CPG) : 150.1 Tj 5. Mdhilla Plant (GCT) : 901.9 Total of the 5 plants: 1,461.9 Tj
Choice of data or Measurement methods and procedures::	The most recent 3 years data prior to the project implementation (2008-2009-2010) are used. Detailed data are presented in annex 3.
Purpose of Data	This parameter is used to calculate the emission factor in the baseline situation expressed as emissions per unit of output (kg CO2e/Tj).
Additional comment:	

Data / Parameter:	$\varepsilon_{heater,\text{baseline}}$
Unit:	%
Description:	Energy Efficiency of heaters
Source of dat:	Calculated using the measured data
Value(s) applied:	73% (average years 2008-2009-2010 for the four CPG plants) 84% (average years 2008-2009-2010 for the GCT plant)
Choice of data or Measurement methods and procedures::	The energy efficiency of the boiler was calculated by the direct method (dividing the net heat generation by the energy content of the fired fuel) . The most recent 3 years data available (2008-2009-2010) at the time of the PDD preparation were used.
Purpose of Data	Used to calculate the baseline quantity of Energy that would be used for heat process in the absence of the project activity (starting from the Useful energy Need in the project situation)
Additional comment:	Calculated for the 4 CPG plants and for GCT plant

B.6.3. Ex-ante calculation of emission reductions

>>

Baseline emissions

$BE_y = \sum_i EF_{i,BSL} * Q_{i,y}$

= 97.327 (tCO2/TJ) * 1,479.1 (TJ)

= 143,957 (tCO2e)[9]

Quantity of heat/steam (1,479.1 Tj) is estimated for ex-ante calculation purposes, based on the historical heat/steam generation of the five Facilities (years 2008 to 2010).

Emission Factor of baseline situation per unit of net energy output (97.327 Tj) is estimated for ex-ante calculation purposes based on historical data of fuel consumption and the resulting heat/steam generation (years 2008 to 2010).

$EF_{i,BSL} = (FC_{i,BSL,y} * NCV_{BSL} * EF_{BSL}) / Q_{BSL,i}$

= 45.367 (Gg) * 40.997 (TJ/Gg) * 77.4 (tCO2/TJ) / 1,479.1

= 97.327 (tCO2 / TJ)

Project emissions

$PE_y = \sum FC_{project,i,y} * NCV_{NG,y} * EF_{NG,CO2}$

= 49,161,250 (Nm3) * 37.833 x 10^{-3} (TJ/1000 Nm3) * 57.76 (tCO2/TJ)

= 107,436 (tCO2e)

Quantity of natural gas combusted in the project scenario ($FC_{project,y}$) is estimated for ex-ante purpose based on the historical fuel consumption, as linked to the historical Heat/Steam generation (2008-2010).

Emission Reductions

$ER_y = BE_y - PE_y$

= 143,957 – 107,436

= 36,521 tCO2/yr

[9] Eventual non-matching results are simply due to the rounding in the EF and Q numbers.

B.6.4. Summary of ex-ante estimates of emission reductions

Year	Baseline emissions (tCO_2 e)	Project emissions (tCO_2 e)	Leakage (tCO_2 e)	Emission reductions (tCO_2 e)
1-04-2013 – 31-03-2014	143 957	107 436	0	36 521
1-04-2014 – 31-03-2015	143 957	107 436	0	36 521
1-04-2015 – 31-03-2016	143 957	107 436	0	36 521
1-04-2016 – 31-03-2017	143 957	107 436	0	36 521
1-04-2017 – 31-03-2018	143 957	107 436	0	36 521
1-04-2018 – 31-03-2019	143 957	107 436	0	36 521
1-04-2019 – 31-03-2020	143 957	107 436	0	36 521
1-04-2020 – 31-03-2021	143 957	107 436	0	36 521
1-04-2021 – 31-03-2022	143 957	107 436	0	36 521
1-04-2022 – 31-03-2023	143 957	107 436	0	36 521
Total	**1 074 358**	**1 439 566**	**0**	**365 207**
Total number of crediting years	10			
Annual average over the crediting period	143 957	107 436	0	36 521

***Source**: [Calculations tables.xls (Sheet: tCO2e)]*

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter:	$FC_{project,v}$
Unit:	Nm^3
Description:	Total quantity of natural gas combusted in the project heaters/boilers during the year y
Source of data:	On-site measurement
Value (s) applied	49 161 250
Measurement methods and procedures:	Monitored using meters. Data is to be aggregated monthly and yearly.
Monitoring frequency	Continuous Monitoring. Data is to be aggregated monthly and yearly.
QA/QC procedures	The meters will be calibrated periodically by the natural gas provider, according to the national regulations. Certificates will be issued after the periodic calibrations are conducted. If erroneous measurement or malfunction is detected, corrective actions will be taken by the natural gas provider. The amount of natural gas combusted will be double checked with the STEG bill
Purpose of data	Basis for the calculation of the project situation
Additional comment	Natural gas flow meters will be calibrated every four years.

Data / Parameter:	$NCV_{NG, y}$
Unit:	TJ/1000 Nm^3
Description:	Net calorific value of natural gas in year y
Source of data	STEG
Value(s) applied	37.833×10^{-3}
Measurement methods and procedures	Actual Calorific Value of the Algerian Natural Gas
Monitoring frequency	Continuous Monitoring. Data is to be aggregated monthly and yearly.
QA/QC procedures	Parameter to be announced by STEG based on crosschecking with Algerian gas provider
Purpose of data	Basis for the calculation of Energy content of fuel used in the project situation
Additional comment	

Data / Parameter:	$\mathbf{EF}_{NG,CO2,y}$
Unit:	t CO_2/TJ
Description:	CO2 emission factor of the natural gas in year y
Source of data	STEG
Value(s) applied	57.76
Measurement methods and procedures	Actual Algerian gas properties in year y.
Monitoring frequency	Continuous Monitoring. Data is to be aggregated monthly and yearly.
QA/QC procedures	Parameter to be announced by STEG based on crosschecking with Algerian gas provider
Purpose of data	Basis for the calculation of Emission Factor of fuel used in the project situation
Additional comment:	

Data / Parameter:	$Q_{Steam, y}$
Unit:	TJ
Description:	Total quantity of steam generated by natural gas in the project boilers during the year y
Source of data	On-site measurement by GCT Facilities
Value(s) applied	17.2
Measurement methods and procedures	Total quantity of Steam (in tons) is to be monitored continuously using meters

Monitoring frequency	Continuous Monitoring. Data is to be aggregated monthly and yearly.
QA/QC procedures	The meters will be calibrated periodically. If erroneous measurement or malfunction is detected, corrective actions will be taken by the involved companies
Purpose of data	Basis for the calculation of the Useful energy needed in the project situation
Additional comment:	Energy content of steam from tons to Tj will be calculated based on the Energy Input and the efficiency below ($\varepsilon_{project,boiler,y}$)

Data / Parameter:	$\varepsilon_{project,boiler,y}$
Unit:	%
Description:	Energy efficiency of the boiler during the year y
Source of data	Calculated using the measured data
Value(s) applied	90,03% (average years 2008-2009-2010)
Measurement methods and procedures	The energy efficiency of the boiler will be calculated by the direct method (diving the net heat generation by the energy content of the natural gas fired) at least quarterly.
Monitoring frequency	Quarterly
QA/QC procedures	The meters used for monitoring of the relevant parameters (steam generation, gas consumption) will be calibrated periodically. Once any erroneous measurement or malfunction is detected, corrective action will be taken by GCT.
Purpose of data	Used to calculate the Useful energy Need in the project situation, which would allow to calculate the resulting baseline fuel consumption (using $\varepsilon_{boiler,baseline}$)
Additional comment:	

Data / Parameter:	$Q_{Heat, y}$
Unit:	TJ
Description:	Total quantity of Heat generated by natural gas in the project heaters during the year y
Source of data	Calculated on the basis of the Energy Input and the efficiency factor (as described below)
Value(s) applied	1,461.9 Tj
Measurement methods and procedures	Energy Input to be measured using gas meters. Efficiency factor is calculated as described below
Monitoring Frequency	Quarterly
QA/QC procedures	The meters used for monitoring the relevant parameter (gas consumption) will be calibrated periodically. If erroneous measurement or malfunction is

	detected, corrective actions will be taken by the involved companies
Purpose of data	Basis for the calculation of the Useful energy needed in the project situation
Any comment:	

Data / Parameter:	$\varepsilon_{project,heater,y}$
Unit:	%
Description:	Energy efficiency of the heaters during the year y
Source of data	Calculated using the measured data for natural gas consumption
Value(s) applied	73% (average years 2008-2009-2010 for the four CPG plants) 84% (average years 2008-2009-2010 for the GCT plant)
Measurement methods and procedures	The energy efficiency of the heaters will be calculated by the direct method (diving the net heat generation by the energy content of the natural gas fired) at least quarterly.
Monitoring Frequency	Quarterly
QA/QC procedures	The meters used for monitoring NG consumption will be calibrated periodically. Once any erroneous measurement or malfunction is detected, corrective action will be taken by CPG and GCT. Heaters' Efficiencies will be calculated taking into account combustion losses (exhausted hot gas during combustion) and thermal losses in the heat transfer channels. Losses are calculated quarterly
Purpose of the data	Used to calculate the Useful energy Need in the project situation, which would allow to calculate the resulting baseline fuel consumption (using $\varepsilon_{Heater,,baseline}$)
Additional comment:	In the baseline situation, the following figures of losses were recorded :

	Exhausted hot gas (%)	Thermal losses in the heat transfer channels (%)
CPG	12%	15%
GCT	13%	3%

B.7.2. Sampling plan

>>

Not applicable

B.7.3. Other elements of monitoring plan

>>

STEG, CPG and GCT will establish an Operating and Monitoring Team to manage the future monitoring activities of the project. The Monitoring Team will compose of a manager based at STEG, and Project Team Members based at the CPG and GCT Companies. The manager is responsible for monitoring and archiving all data associated with items depicted in the monitoring

methodology described above. Team members from CPG and GCT are assigned to the task of monitoring different parameters on a timely basis as well as recording and archiving data in an orderly manner. All data collected as a part of monitoring plan will be archived electronically and kept at least 2 years after the end of the crediting period. Monitoring reports will be reviewed by the manager on a monthly basis in order to ensure that the Project activity meets all monitoring requirements as outlined above.

Introduction

The Monitoring Plan is an integral part of this PDD. The purpose of this Monitoring Plan (MP) is to provide a standard by which STEG/CPG/GCT will conduct accurate and consistent monitoring and verification of the emission reductions, in accordance with all relevant rules and regulations of the CDM. The MP will therefore facilitate achieving the expected Certified Emission Reductions (CERs).

STEG/CPG/GCT will use the MP for the duration of the Project activity. The company will strictly follow the MP in order to measure and track the project impacts and prepare for the periodic verification process required to confirm the amount of CERs achieved.

Specifically, the MP will facilitate:

- Establishing and maintaining a suitable monitoring system
- Implementing the necessary measurement and management operations for the CDM project
- Ensuring that the project will be meeting CDM requirements for verification and certification

Operational and Monitoring Obligations

In order to facilitate accurate CER determination, the project participant must fulfil a number of operational and data collection obligations. This will ensure that emission reductions are calculated in a transparent manner and monitoring is carried out as stipulated in the MP.

All data required for emission reduction determination shall be monitored as described in Section B.7.1 of this PDD.

Management and Operational Systems

In order to ensure a successful operation of the Project and the credibility and verifiability of the CERs achieved, the Project will have a well-defined management and operational system. A system will be put in place for the Project and include the operation and management of the monitoring and record keeping system that is described in this MP.

The project partners implement a management and operational system that meets the requirements of the Project. This includes:

Project management responsibilities

The management and operation of the Project is the responsibility of the Project partners, i.e. STEG/CPG/GCT. Ensuring the environmental credibility of the Project through accurate and systematic monitoring of the Project's implementation and operation for the purpose of achieving trustworthy CERs is the key responsibility and accountability of the three partners.

STEG will have the leading responsibility in handling the MP and preparing all elements requested for verification and certification purposes. STEG designates a competent manager who is in charge of and accountable for the generation of CERs. His role will include: (i) establishing monitoring and verification protocol; (ii) Executing monitoring activities (Periodic reporting,

cross-checking data, record keeping, computation of CERs, signing-offs on all GHG Emission worksheets, verification and launching the various calibration activities, etc.), (iii) Executing audits and verification: contracting DOE, launching annual verification activities, etc.

Persons at CPG and GCT levels, responsible for data collection and coordination with the Project Manager will also be designated.

Data handling

- The establishment of a transparent system for the collection, computation and storage of data, including adequate record keeping and data monitoring systems. The project participants develop and implement a protocol that provides for these critical functions and processes, which will be fit for independent auditing. This protocol will include a monthly data collection and storage, at CPG and GCT, and monthly transmission of these data to the project Manager at STEG. In return, STEG will prepare Quarterly Monitoring Reports, and transmit it to CPG and GCT.
- Annual Monitoring reports will also be prepared as per verification purposes, in accordance with CDM rules and regulations. Annual Monitoring Reports will be transmitted to CPG and GCT, and to any other stakeholder (e.g. DNA) if requested by national regulations.

Quality Assurance

QA will include:

- Well-defined protocols and routine procedures, with good, professional data entry, extraction and reporting.
- Transparent data transmission archiving among the three partners
- Proper management processes and recording of official data
- Frequent meetings and communication between the three partners
- Frequent cross-checking of data and results among the three partners, based on monthly, quarterly and annual reports.

Training

- Internal training is made available to operational staff to enable them to undertake the tasks required by this MP. Initial staff training is provided before the Project starts operating and generating CERs.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

>>23 November 2009

C.1.2. Expected operational lifetime of project activity

>>

20y-0m

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>>

Fixed crediting period

C.2.2. Start date of crediting period
>>
01/04/2013

C.2.3. Length of crediting period
>>
10y-0m

SECTION D. Environmental impacts
D.1. Analysis of environmental impacts
>>
According to the Tunisian legislation (Decree 91-362, 13 March 1991) [10] related to the Environmental Impact Assessment (EIA), fuel switching actions are not required to carry out a mandatory EIS. As a result, from the consumer side (CPG and GCT), they are not expecting to conduct such EIA.

Decree 91-362 however requires carrying out EIA for the implementation of oil and gas transportation pipelines. This was undertaken in February 2010 by accredited external experts and was endorsed by the Tunisian Environmental Protection Agency (ANPE), as required by Tunisian Legislation. The EIA addressed all potentially tangible environmental impacts. The EIA report of the project activity concludes that the project does not have significant environmental impacts. Some minor negative impacts were identified, but they are easily manageable and can be minimized through the implementation of the recommended Environmental Management Plan over the whole construction and exploitation phases. Once implemented, the project would lead to insignificant residual impacts; which are compensated by the project's economic, environmental and social benefits.

The gas pipelines will entail potential impacts on the natural and human environment of the areas through which these infrastructures will be established. The EIA includes precise recommendations for mitigating the impacts through conservation measures during execution of the works, as well as for limiting impacts during operations of the pipeline.

Impacts during construction phase

Impacts on soils
The key environmental impacts on soils result from the excavation works necessary to prepare trenches where the pipelines are to be buried. According to the EIA, this however doesn't affect the quality of soil as the trenches are almost immediately covered with the previously moved soil.

Soil disturbance might also occur when installing encampments. These however will not be installed in agricultural lands, thus avoiding any side effect on soils.

The EIA concluded that intensity; surface and duration of the impacts on soils are limited.

Impacts on air quality

There are some quantities of GHG and dust emissions during the excavation and pipeline burial works, but they are temporary, very localized and of limited intensity.

[10] Abrogated by Decree n° 2005-1991 of July 11, 2005.

The EIA concluded that intensity; surface and duration of the impacts on air quality are insignificant.

Impacts on water

The EIA indicated that impact on water is negligible, as water table is located much beyond the 3 meters maximum depth of the trenches.

Impacts on biological environment

EIA concluded that impacts on Flora/Fauna and on areas/protected species and landscape are localized and limited in intensity and duration.

Impacts on road traffic and infrastructures

EIA concluded that impacts are limited.

Impacts on human establishments

EIA concluded that impacts on security of the persons and health are limited provided that precautions are well taken.

Impacts on local Economy

EIA indicated that the works will result in creating 3000 days of job for 10 persons, benefiting to the local economy.

Impacts during exploitation phase

The EIA indicated that negative impact during exploitation is insignificant.

STEG has developed high standard maintenance practices over its long experience of gas pipelines management, thus maintenance measures will have very limited impacts. Systematic periodic inspections will also contribute to environment preservation and prevent accidents, thus maximizing security for the pipeline and for the surrounding population.

On the other side, the project will result in significant positive impacts. It will reduce pollution and GHG emissions, and will improve profitability for the gas users. Furthermore, gas transportation through pipeline is less energy intensive than transporting liquid fuels or LPG, and will reduce road traffic.

EIA indicated that the exploitation of the pipeline will create significant number of stable jobs, and will also attract new industries in the region, thus benefiting to the locally economy.

Impacts during dismantling operations

The fuel switching to natural gas is seen as a definitive energy solution for the region in a long term perspective. Therefore, the pipeline is not supposed to be dismantled anyhow. However, in case dismantling was to be considered, STEG would undertake the dismantling operations in conformity with the national safety regulations and best environmental practices.

Mitigating measures recommended by the EIA

The EIA made a full set of recommendations to STEG and sub-contractors to eliminate, mitigate and ultimately compensate any of the identified negative impacts of the project into the environment.

Measures to be applied during the construction phase

The project is to be executed according to the procedures established by the "Oil Industry International Exploration and Production Forum – E&P Forum", related to health, security and environment.

Organisational measures include information and consultation with national, regional and local authorities. They also suppose meeting health, security and environmental rules, and must include implementation of an Emergency Plan.

Designing and executing an Environmental Management Plan (EMP) is also part of the recommended measures. The design of the EMP was undertaken as a part of the EIA, and it was effectively executed during the construction phase.

Other measures include:

- Conducting reconnaissance campaigns prior to launching the construction phase
- Utilize specific techniques when going through railway lines, roads or rivers.
- Preserve vegetal cover
- Preserve vegetal soils
- Compensate to the benefit of local population and farmers for any damage or any land requisition.

The implementation of all these measures will reduce the environmental impacts to the maximum extent possible, and will minimize any residual impact.

Measures to be applied during the exploitation phase

Measures include implementation of rigorous testing procedures during pipeline replacement or addition. As a part of the monitoring and control procedures, frequent inspections are also required to prevent internal and external corrosion of the pipelines. STEG will maintain archives of results and recommendations of inspections as well as preventive and corrective actions undertaken. Moreover, any significant incident that might affect the security of the pipeline should be communicated to the Ministry in charge of the energy sector, as to secure urgent corrective actions.

The implementation of the Environmental Management Plan (EMP) will ensure that environmental risks are adequately identified and promptly addressed, and that impacts are minimized, mitigated and properly monitored.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

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

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Prior to the design of the project, various consultation meetings were organized with national and local authorities, by STEG and the two involved partners (CPG and GCT) under the umbrella of the former Ministry of Industry, Energy and Small and Middle Enterprises.

In addition, a CDM-dedicated Stakeholders' meeting was held by the three involved partners: STEG, CPG and GCT on April 28, 2010. The meeting took place at the Gafsa Palace Hotel. Direct contacts and invitations were sent by STEG, the leading company of the project, to the following stakeholders to attend the meeting:

- Representatives from the Gafsa Governorate
- Representatives from the Communal cities covered by the project (El Ksar, Gafsa, M'Dhilla, Metlaoui, Oum Laareyes).
- Representatives from National Environment Protection Agency
- Representatives from Regional Commissariat of Agricultural Development (CRDA)
- Representatives from Regional Director of Ministry of Equipment
- Representatives from Regional Director of Civil Protection
- Representatives from University of Gafsa
- Representatives from GTZ
- Representatives from various Departments of CPG
- Representatives from various Departments of GCT
- Representatives from various Departments of STEG, including the Regional District
- The consultant in charge of the PDD design

A total of 16 representatives of the above-mentioned organizations, and 17 representatives from various STEG regional and central departments attended the meeting. The meeting showed a strong interest in the project from participants as it will contribute to introduce a modern and clean energy in the industries of the region, and thus improve local air quality, while also supporting local development. Moreover, as a positive side-effect of the project, Gafsa city will also benefit from a district gas network, thus improving the Comfort and the Economics for the population, as natural gas displaces the less practical and more expensive most commonly used LPG.

Three PowerPoint presentations were made in the meeting, addressing the main following issues:

- Description of the project, circumstances, objectives, technical characteristics. The presentation also included a description of the main social, economic and environmental benefits.
- Description of the CDM process, and its operational modalities
- Description of the CDM process engaged for the project "*Integrated fuel Switching Project at Industrial Facilities in Gafsa Region – Tunisia*".

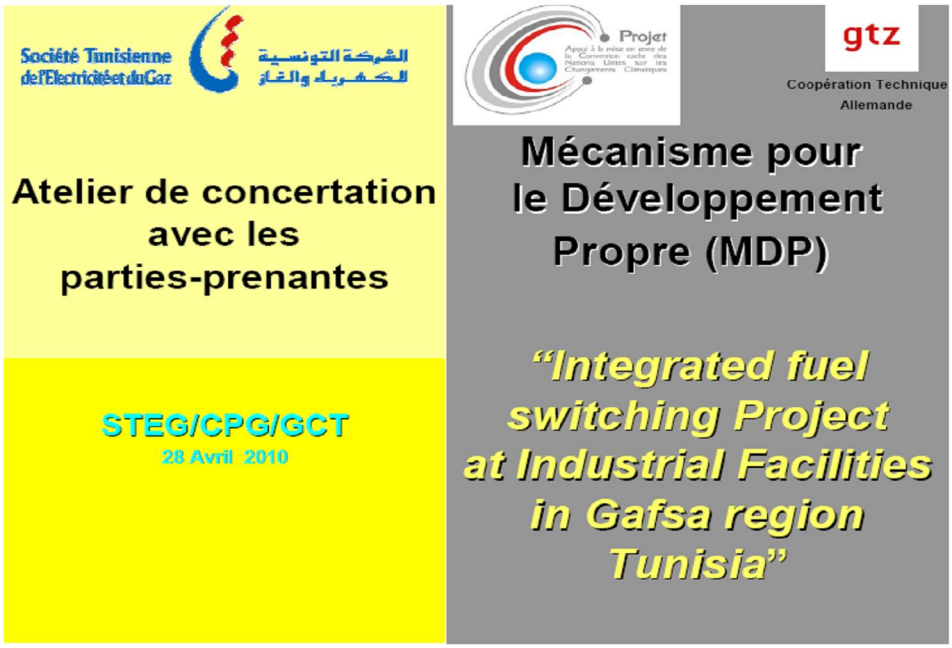

Figure 4 – Flyleaf of the Stakeholder's consultation meeting

Figure 5 – Pictures of the Stakeholder's consultation meeting

Figure 6 – Pictures of the Stakeholder's consultation meeting

E.2. Summary of comments received

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At the end of each presentation, participants were invited to exchange views and comments related to the project as well as to the content of the presentation.

Most of the participants received very positively the implementation of the project, recalling that the Environmental Impact Assessment was adequately undertaken and that risks were duly taken into account.

Major issues addressed during the discussions focused on the following issues:

- The need that other companies in the region benefit from the gas connection.
- The need that the execution of works as well as security issues be rigorously monitored.
- The need to take care of the existing electricity, water, Telephone and sanitation networks when conducting works.
- The need to sort out land tenure issues
- The need to restore pavements after works.
- The gas network should also be appropriately marked as to avoid any accident occurring during eventual future road works, civil engineering works or any networks' related works (Water, Electricity and Sanitation).
- The positive economic impacts that the project will have, as the gas will promote the implementation of new industrial companies in Gafsa region. Another participant also invoked potential negative impacts on employment (particularly those operating on liquid fuel transportation, which will be displaced as a result of the gas connections).

At the end of the meeting, a questionnaire was distributed. The survey was intended to gather additional questions/comments from the participants. The questionnaire included 8 questions:

1. Did you heard about the project before?
2. Were you in favour of the implementation of the project?
3. What are the positive implications of the project for you?
4. What are the negative side-effects of the project for you?
5. How did you find the consultation process launched by STEG/CPG/GCT prior to the project implementation?
6. What is the level of satisfaction regarding the way the overall project is being implemented by STEG/CPG/GCT?
7. Do you have any proposal?
8. Other comments :

Seven questionnaires were completed by participants before they left the meeting room. The responses to the questions were completely consistent with the issues discussed during the meeting. All seven questionnaires responded positively to questions 1 and 2, suggesting well knowledge and full support to the project, given its contribution to the local development. Regarding question 3, respondents pointed out the positive economic and social impacts (implementation of new industries, employment, improvement of the life conditions of the population, etc.), as well as energy savings, environment protection, and mastering gas-related technologies.

However, respondent also pointed out as a response to question 4, the risks of accidents resulting from the use of natural gas, and the possible employment losses due to elimination of needs for liquid fuel transportation.

Regarding questions 5 and 6, respondents expressed pretty good satisfaction about the consultation process and the way the project is being implemented. As regards to question 7, respondents indicated some proposals, but most of them related to the implementation of the gas network in the city of Gafsa; which in fact is out of the project boundaries.

E.3. Report on consideration of comments received

>>

The regional Director of STEG confirmed that several other companies have expressed their willingness to get connected to the new natural gas network. STEG will reply positively to their request as soon as they apply officially for that.

The regional Director of STEG also recalled that security measures will be strictly put in place during the execution of the civil engineering and connection works, as they usually did in previous gas connection projects in other Tunisian regions. STEG is highly familiar with the interaction of gas connection works with other networks and city pavement and roadways, and used to be strict vis-à-vis sub-contractor regarding the quality of works and restoration of previous states of the existing installations. Furthermore they used to closely cooperate with local representatives and services, as well as getting necessary authorisations before undertaking works.

Regarding land tenure issues, the regional director also indicated that these issues are appropriately addressed, as they systematically get supports from lawyers and agricultural experts.

Regarding the potential negative impacts on employment, it was recalled that employment impacts of the region should be analyzed globally. Apart from the flexibility of the employees of the liquid fuel transportation activities, who would certainly move to other transportation activities, the new industrial entities that would result from the gas connection would certainly generate much higher employment opportunities. Furthermore, several temporary jobs during the connection works, as well as stable jobs for maintaining and monitoring gas network will more than compensate the potential employment losses.

SECTION F. Approval and authorization

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The letter of approval from Host Party (Tunisia) for the Project activity was issued on 2 Novembre 2011 and is included below.

02 NOV 2011

REPUBLIC OF TUNISIA
***
MINISTRY OF AGRICULTURE AND ENVIRONMENT
***
CDM DNA for Tunisia

LETTER OF APPROVAL
To
The Executive Board of the Clean Development Mechanism (CDM) under the Kyoto Protocol

Letter of approval for the project *Integrated fuel switching Project at Industrial Facilities in Gafsa region – Tunisia* (hereinafter "the Project")

In my capacity as authorized representative of the CDM Designated National Authority for Tunisia (hereinafter "CDM DNA for Tunisia"), under the Kyoto Protocol, I hereby confirm that:

(i) Tunisia ratified the Kyoto protocol in June 2002;
(ii) Tunisia's participation in the CDM is voluntary;
(iii) The Project will contribute to the sustainable development of Tunisia.

In my capacity as authorized representative of the CDM DNA for Tunisia, I authorize "La Société Tunisienne de l'Eléctricité et du Gaz (STEG)" to participate in the Project.

In my capacity as authorized representative of the CDM DNA for Tunisia, I confirm that the Project, as proposed, is in compliance with all relevant Host country (Tunisia) national laws.

In my capacity as authorized representative of the CDM DNA for Tunisia, I recognize all rights, titles and interests of "La Société Tunisienne de l'Eléctricité et du Gaz (STEG)" in and to all greenhouse gas emission reductions brought about by the Project as well as all CERs created by the Project.

I hereby approve, on behalf of the CDM DNA for Tunisia, the project ***Integrated fuel switching Project at Industrial Facilities in Gafsa region – Tunisia*** as a CDM project, for the purposes of article 12 of the Kyoto Protocol.

Yours faithfully,

(*Signed*) Mr. Salem HAMDI
Secretary of State for Environment
Ministry of Agriculture and Environment
Tunis -Tunisia

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Appendix 1: Contact information of project participants

Organization:	STEG
Street/P.O.Box:	19 Street Bel Hassen Ben Chaabane 1005 El Omrane
Building:	
City:	Tunis
State/Region:	
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Telephone:	+216 71 959 788
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E-Mail:	dgz@steg.com.tn
Web Site:	
Contact Person	
Title:	Director
Salutation:	Mr
Last Name:	CHAARI
Middle Name:	
First Name:	Mohamed
Department:	Gas
Mobile:	
Direct FAX:	+ 216 71 959 806
Direct tel:	+ 216 71 959 788
Personal E-Mail:	mchaari@steg.com.tn

Appendix 2: Affirmation regarding public funding

Project financing will not involve ODA or public funding from any Annex I countries

Appendix 3: Applicability of selected methodology

Not further information, please refer to section B.2.

Appendix 4: Further background information on ex ante calculation of emission reductions

Table A.4.1 - Historical Output production by the participating facilities (tons)

		2008		2009		2010		Average 3 years
		Phosphat	TSP	Phosphat	TSP	Phosphat	TSP	
Compagnie des Phosphates de Gafsa (CPG)	1. Oum Laarayes	372 154		117 700		279 199		***256 351***
	2. Mdhilla Zone L	198 760		208 194		241 164		***216 039***
	3. Mdhilla Laverie	198 760		209 299		305 478		***237 846***
	4. Metlaoui	474 033		128 996		312 529		***305 186***
	TOTAL CPG	**1 243 707**		**664 189**		**1 138 370**		**1 015 422**
Groupe Chimique de Tunisie (GCT)	5. Mdhilla		*495 500*		*414 300*		*456 900*	***455 567***

***Source**: [Données à collecter CPG-GCT1.xls (Sheet: Annex3)]*

Table A.4.2 - HISTORICAL FUEL CONSUMPTION BY FINAL USE (tons)

		2008			2009			2010			Average 3 years
		Dryers	Boiler	**TOTAL**	Dryers	Boiler	**TOTAL**	Dryers	Boiler	**TOTAL**	
Compagnie des Phosphates de Gafsa (CPG)	1. Oum Laarayes	5 965		**5 965**	2 585		**2 585**	4 529		**4 529**	***4 360***
	2. Mdhilla Zone L	4 477		**4 477**	4 230		**4 230**	4 556		**4 556**	***4 421***
	3. Mdhilla Laverie	4 727		**4 727**	4 252		**4 252**	5 770		**5 770**	***4 916***
	4. Metlaoui	7 807		**7 807**	2 202		**2 202**	5 033		**5 033**	***5 014***
	TOTAL CPG	**22 976**	**0**	**22 976**	**13 269**	**0**	**13 269**	**19 888**	**0**	**19 888**	***18 711***
Groupe Chimique de Tunisie (GCT)	5. Mdhilla	28 261	284	**28 545**	23 381	891	**24 272**	26 924	226	**27 150**	***26 656***
TOTAL		**51 237**	**284**	**51 521**	**36 650**	**891**	**37 541**	**46 812**	**226**	**47 038**	***45 367***

***Source**: [Données à collecter CPG-GCT1.xls (Sheet: Annex3)]*

Table A.4.3 - Historical Heat and Steam Generation by the participating facilities (kg thermies)

		2008			2009			2010			Average 3 years
		Heat (kg thermies)	Steam (kg thermies)	TOTAL	Heat (kg thermies)	Steam (kg thermies)	TOTAL	Heat (kg thermies)	Steam (kg thermies)	TOTAL	
Compagnie des Phosphates de Gafsa (CPG)	1. Oum Laarayes	42 639		**42 639**	18 478		**18 478**	32 374		**32 374**	***31 164***
	2. Mdhilla Zone L	32 002		**32 002**	30 237		**30 237**	32 567		**32 567**	***31 602***
	3. Mdhilla Laverie	33 789		**33 789**	30 394		**30 394**	41 245		**41 245**	***35 143***
	4. Metlaoui	55 806		**55 806**	15 740		**15 740**	35 977		**35 977**	***35 841***
	TOTAL CPG	**164 236**	**0**	**164 236**	**94 849**	**0**	**94 849**	**142 163**	**0**	**142 163**	***133 749***
Groupe Chimique de Tunisie (GCT)	5. Mdhilla	232 455	2 460	**234 915**	192 315	7 961	**200 276**	221 457	1 930	**223 388**	***219 526***
TOTAL		**396 691**	**2 460**	**399 151**	**287 164**	**7 961**	**295 125**	**363 620**	**1 930**	**365 550**	***353 275***

***Source**: [Données à collecter CPG-GCT1.xls (Sheet: Annex3)]*

Table A.4.4 - Historical Properties of Algerian Natural Gas

	Voluminic Density (kg/Nm3)	NCV (TJ/MNm3)	NCV (TJ/Gg)	Carbon Content (kg-C/Gj)	Carbon Emission Factor (Kg-CO2/Tj)
2008	0.814	37.847	46.478	15.74	57 715
2009	0.808	37.732	46.674	15.73	57 694
2010	0.815	37.919	46.506	15.79	57 883
Average	**0.813**	**37.833**	**46.553**	**15.75**	**57 764**

Table A.4.5 - Investment costs involved within the CDM Project boundaries

	Diameter (Inches)	Length (km)	Cost (supply, laying, etc.) - 1000 DT -
Gas distribution infrastructure			
20" (PS3 , Mdhilla)	20	40	21 628
1. Connection Om larayes	8	20	3 764
2. Connection Washing Unit Mdhilla Area L (1&2)	4	1,5	239
3. Connection Washing Unit Mdhilla (3)	8	12	2 260
4. Connection Metlaoui	8	12	2 260
5. Connection GCT	8	4,5	919
Intra-muros connections to the factories			
CPG (4 units)			800
GCT (1 unit)			200
Pressure Relief stations			
CPG (4 units)			2 000
GCT (1 unit)			500
NG Burners			
CPG (4 units)			1 200
GCT (1 unit)			300
Other NG conversion works			
CPG (4 units)			500
GCT (1 unit)			200
Other Overall costs			
Land Tenure arrangements			2 900
TOTAL		**90**	**39 670**

Table A.4.6 - Historical variations of the Fuel oil and natural gas domestic prices in Tunisia (2000-2009) (*)

		Fuel Oil (DT/toe) VAT excluded	Natural Gas (DT/toe) - VAT excluded(**)			
			High Pressure (HP)	High Pressure 1 (HP1)	High Pressure 2 (HP2)	
				Subscribed Flow < 30 000 th / h	Subscribed Flow >30 000 th / h	
	DATE				<2000 toe/month	>2000 toe/month
1	26/03/2000	131				
2	08/08/2000	131				
3	15/08/2000		138			
4	04/04/2003	139				
5	01/05/2004		146			
6	08/05/2004	148				
7	01/08/2004	173	154			
8	13/02/2005	182				
9	05/06/2005	201				
10	04/09/2005	214				
11	01/01/2006		165			
12	15/01/2006	232				
13	26/04/2006	251				
14	02/07/2006	260				
15	06/05/2007	274				
16	01/07/2007		179			
17	28/10/2007	292	199			
18	01/12/2007			196	196	201
19	02/03/2008	310		196	196	221
20	01/04/2008			222	222	289
21	06/07/2008	365		222	222	348
22	01/09/2008			267	267	348
23	16/01/2009	346		267	267	329

(*) *Official domestic prices in the whole territory of Tunisia as decided by the Ministry in charge of Energy.*

(**) *Official domestic prices in the whole territory of Tunisia as decided by the Ministry in charge of Energy. Subscription and Flow-fees are not included in the mentioned tariff. They fully depend on the subscribed and expected gas flow. As for illustration, Flow-fees were established at 0.4 dinar/th-h-month for both HP1 and HP2 gas*

Appendix 5: Further background information on monitoring plan

Not further information. Monitoring information is included in section B.7 of this PDD

Appendix 6: Summary of post registration changes

Not Applicable

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History of the document

Version	Date	Nature of revision
04.1	11 April 2012	Editorial revision to change history box by adding EB meeting and annex numbers in the Date column.
04.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the project design document form for small-scale CDM project activities" (EB 66, Annex 9).
03	EB 28, Annex 34 15 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.
02	EB 20, Annex 14 08 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
01	EB 07, Annex 05 21 January 2003	Initial adoption.
Decision Class: Regulatory **Document Type:** Form **Business Function:** Registration		