CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Annexes

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 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>.
03	22 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.

SECTION A. General description of small-scale project activity

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

- Title of the project activity: "Fuel Switching of AmirKabir Sugarcane Plant"
- Version number of the document: Version6.0, 28/03/2011

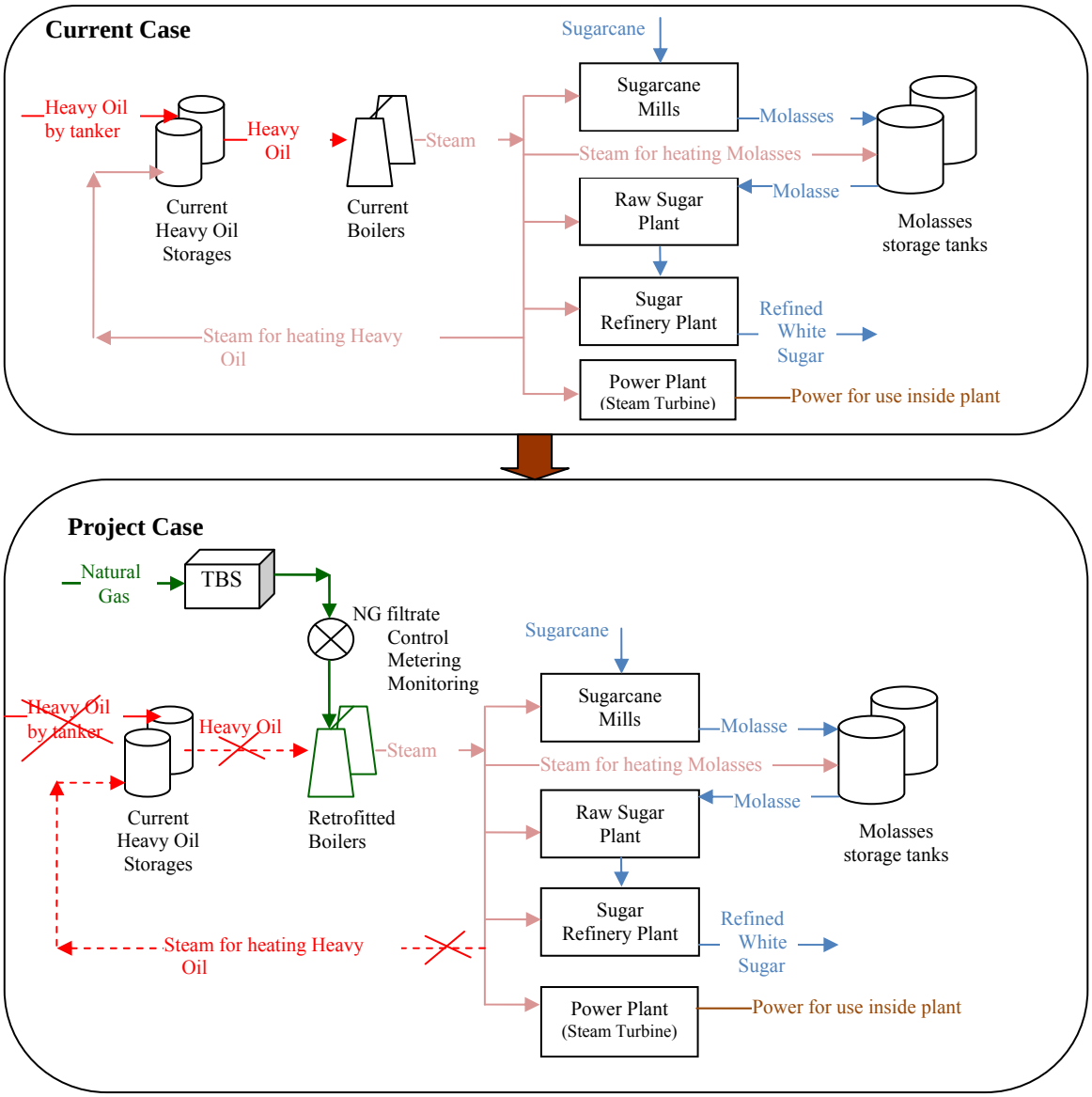
A.2. Description of the small-scale project activity:

AmirKabir Agri Industrial Company got in operation in year 2001 to produce sugar from sugarcane in Khuzestan province of Iran. The main activity of this company is producing annually about one million tons of sugarcane, 100,000 tons raw sugar and receives another 75,000 tons of raw sugar from a nearby plant to process 175,000 tons of raw sugar and produce refined white sugar. Steam is used in the production process to warm up and saturation of sugar syrup, to operate the mills and shredders, to operate steam turbines and etc. Required steam is produced in two nearby boilers each equipped with four burners using Heavy Oil as fuel. Each boiler produces about 190 ton/hr steam consuming about 14 ton/hr of Heavy Oil, while running in full capacity.

The purpose of this project activity, in line to sustainable development of country, is to mitigate GHGs and increase the energy supply security through switching from Heavy Oil (Residual Fuel Oil) to Natural Gas, as the less carbon intensive energy source and the best available source of energy in the region. The project activity will result in reduction of GHGs, decreasing air pollution and thus soil and water pollution, increasing of energy supply security for project proponent and finally will provide financial resources making the project economically feasible and attractive. Successful implementation of this project, will promote local and related high energy consuming industries to follow that and thus the sustainable development.

The project activity consists of piping from local gas station (TBS) to the boilers, and adapting the existing boilers to utilize Natural Gas. Required systems for filtration of Natural Gas at the entrance to the boilers, controlling, metering and monitoring of Natural Gas shall be installed.
Estimated annual emissions reduction is 55,885 tCO_2e.

Figure A.1 Schematic Diagram of the Project



The project activity contributes to sustainable development for several reasons:

- Reduction of GHGs
  Due to the use of Natural Gas as it is less carbon intensive than the substituted fossil fuel, Heavy Oil, the greenhouse gases emissions are reduced.

- Environmental well being
  Using Natural Gas in substitution to Heavy Oil, results in the reduction of other air pollutants such as SOx, NOx and PMs. Heavy Oil contains large amounts of sulfur (about 3% mass) while this is insignificant in Natural Gas. Fuel switching from Heavy Oil to Natural Gas, thus will decrease the SOx emissions considerably. Also it will decrease large portion of NOx and PMs. This is regardless of emission / pollution reductions from omitted tankers, who are transporting Heavy Oil from refineries to the plant.

- Social well being
  The implementation of the project creates social benefits related to improvement of labor conditions. Decreased air pollutants in parallel to prevention of possible water contamination (because of Heavy Oil leakage from storage tanks and tankers during transportation from refineries and discharging to storage tanks) will improve the social health conditions. Potential risks of skin contacts of maintenance people with Heavy Oil, and fire and explosion risks of Heavy Oil tanks will be prevented.

- Energy security
  Supplying Natural Gas is more secure than Heavy Oil to AmirKabir Agri Industrial because of lack of Heavy Oil and also transportation problems in winter time. Almost of local industries use Heavy Oil as their energy source, even the power plants, but the capacity of refineries to produce Heavy Oil (or other type of liquid fuels) is limited. In high consumption seasons, supply of Heavy Oil from refineries goes in risk. Also as Iran stands as the second owner of Natural Gas reservoirs, Natural Gas is safer to supply than the refined oil products like Heavy Oil.

- Employment well being

  The implementation of the project increases employment opportunities in the project location. The project activity will build private sector capacity, establish credit lines and facilitate collaborative arrangements with foreign suppliers of equipment and services. Local job opportunities like construction, piping and welding, installation and commissioning of equipments will be created.

A.3. Project participants:

Name of Party involved ((host) indicates a host party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the party involved wishes to be considered as project participant (Yes/No)
Iran (host)	AmirKabir Agri Industrial Co.	**No**
	Mehr Renewable Energies Co.	
Switzerland	Climate Protection Finance AG	**NO**

Please see the contact information listed in annex I.

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

A.4.1.1. Host Party(ies):

Islamic Republic of Iran, which has ratified the Kyoto Protocol

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

Khuzestan

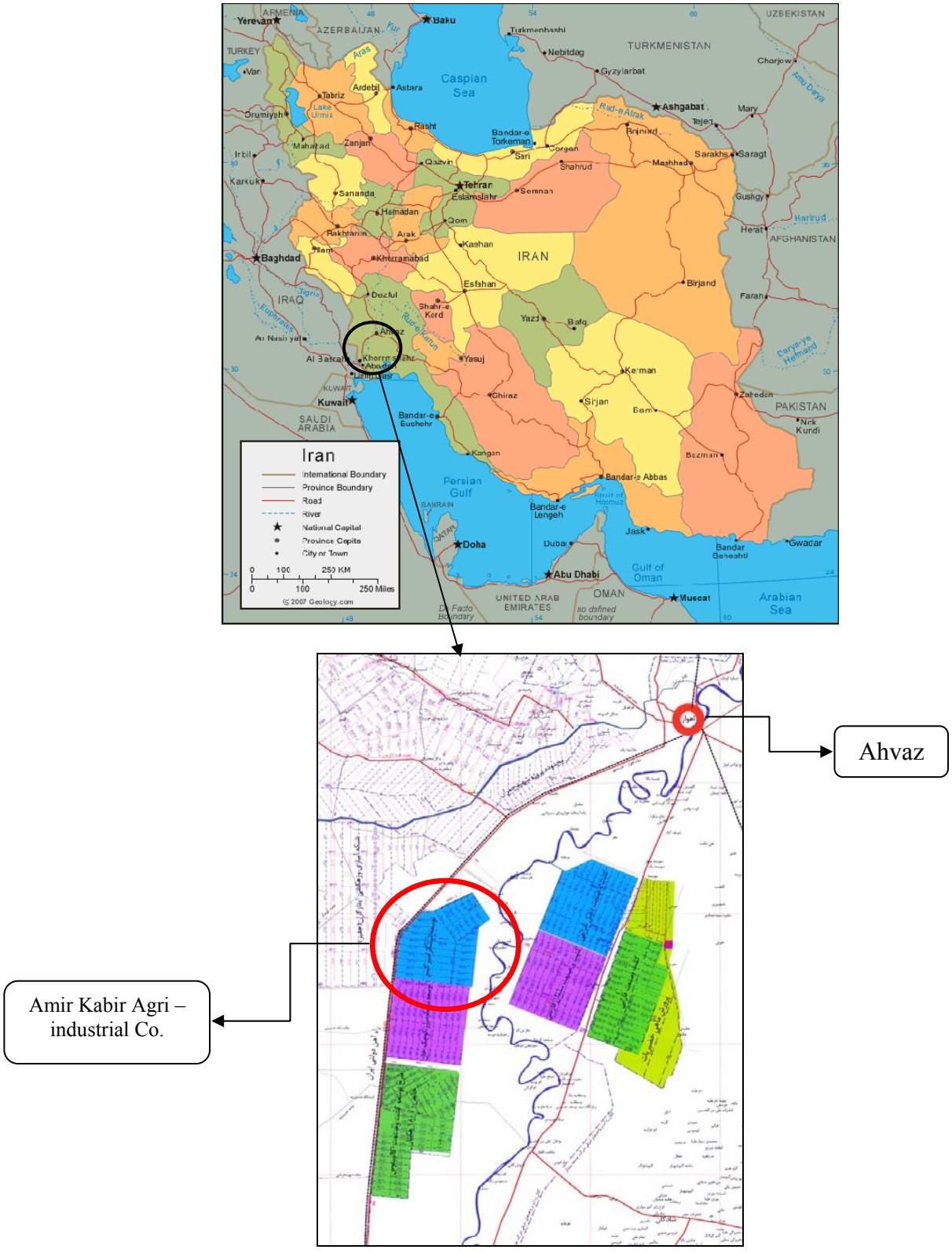
A.4.1.3. City/Town/Community etc:

Ahvaz- KhorramShahr road

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

The project site is located at facilities of AmirKabir Agri Industrial Co., km 45, Ahvaz – KhorramShahr road, Ahvaz, Iran.
The coordinates of the project are: 31° 1' 47" N – 48° 16' 47" E

Figure A.2 – a) Map of Iran Islamic Republic (above) , b) Project activity Location (bellow)



A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

According to Appendix B of the simplified modalities and procedures for small-scale Clean Development Mechanism project activities, AmirKabir Agri Industrial project is under:

Type III: Other project activities
Category B: Switching fossil fuels (version 14)
Sectoral Scope 1 – Energy industries (renewable – non-renewable sources)

For switching from Heavy Oil to Natural Gas, four burners of each boiler shall be retrofitted to utilize Natural Gas. It might be noted that the burners were designed as Dual-fuel to be able to use Heavy Oil or Natural Gas. But some parts and sensors required for Natural Gas consumption were not installed on burners and supply of them is part of this project activity.
The boilers are supplied by FOSTER WEELER ENERGIA S.A. equipped to four ICORSA made burners. Burners consume 3,144 Nm^3/hr of Natural Gas which is enough for expected amount of heat demand at the plant. The specifications of the current boiler, the project boiler (after modification) and Natural Gas burner are as follows:

Table 1: Boilers Specification

	Baseline scenario	**Project scenario**
Model	SD-33	SD-33
Capacity	190 Tm/hr	190 Tm/hr
Operating pressure	30.6 kg/cm2 (g)	30.6 kg/cm2 (g)
Steam Temperature	380 °C	380 °C
Main fuel used	Heavy Oil	Natural Gas
Efficiency	90.25%	90.52%

Source: AmirKabir Agri Industrial Co.& Manufacturer

Table 2: Burners Specification

	Heavy Oil Burner	**Natural Gas Burner**
Manufacturer	ICORSA	ICORSA
Model	DAZ-32	DAZ-32
Nominal flow (100%)	3454 kg/h	3144 Nm^3/h
Pressure in burner	10 kg/cm^2	1 kg/cm^2

Source: AmirKabir Agri Industrial Co.& Manufacturer

The Natural Gas is supplied by National Iranian Gas Company. The composition of the Natural Gas sample is described in the following table.

Table 3: Composition of Natural Gas (Sample)

Component	Value (Mole percentage)
Methane (CH_4)	95.603%
Ethane (C_2H_6)	2.692%
Propane (C_3H_8)	0.810%
Iso- Butane (i-C_4H_{10})	0.081%
Normal- Butane (n-C_4H_{10})	0.154%
Iso- Pantene (i-C_5H_{12})	0.028%
Normal – pentene (n-C_5H_{12})	0.025%
Hexane and heavier materials (other Hydrocarbons $\geq C_6H_{14}$)	0.026%
Carbonic Anidrid	0.381%
Nitrogen (N_2)	0.200%
Total	100%

Source: National Iranian Gas Company (NIGC)

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

Table 4: Estimated amount of emission reductions

Year	Estimation of annual emission reductions in tones of CO_2
Year 1	55,885
Year 2	55,885
Year 3	55,885
Year 4	55,885
Year 5	55,885
Year 6	55,885
Year 7	55,885
Year 8	55,885
Year 9	55,885
Year 10	55,885
Total estimated reductions (tons of CO_2)	558,850
Total number of crediting years	10 years
Annual average over the crediting periods of estimated reductions (tones of CO_2)	55,885

A.4.4. Public funding of the small-scale project activity:

The project will not receive any public funding from parties included in Annex I.

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

As mentioned under Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM Project Activities:
"A proposed small-scale project activity shall be deemed to be a de-bundled 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:

- With the same project participants;
- In the same project category and technology/measure;
- Registered within the previous 2 years; and
- 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 this is the first and only project activity or an application to register a project activity by him in the region. Therefore the above criteria of de-bundling cases are not applicable for this CDM project.

SECTION B. Application of a baseline and monitoring methodology

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

The project activity applies the approved baseline methodology as defined in Appendix – B of the Simplified Modalities & Procedures for Small-Scale CDM Project Activities;
AMS Type III. – "Other Project Activity"
Category B. Switching fossil fuels (version 14)

B.2 Justification of the choice of the project category:

According to the technology/measure conditions in the approved methodology AMS-III.B: Switching Fossil Fuels (version 14), this project have to comprise primarily a fossil fuel switching in industrial, residential, commercial, institutional or electricity generation applications. The Project will use Natural Gas in substitution to Heavy Oil, in the existing AmirKabir Agri Industrial Sugarcane plant boilers and has estimated annual emissions reduction of less than 60kt CO2e, making it applicable as a small-scale project.

Technology/measure conditions from AMS III.B are explaining in the following table:

AMS III.B (version 14) **applicability conditions**	**Condition's compliance**
This methodology comprises fossil fuel switching in industrial, residential, commercial, institutional or electricity generation applications (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).	The project Activity consists of the replacement of Heavy Oil by Natural Gas in the boilers used to produce steam in an industrial entity (Sugarcane Plant of AmirKabir Agri Industrial Co.).
Fuel switch may be in a single element process or may include several element processes within the facility. Multiple fossil fuel switching in an element process however is not covered under this methodology.	The Project Activity involves only fuel switching from Heavy Oil to Natural Gas in a single element process.
This methodology is applicable for new facilities as well as for retrofit or replacement of existing installations.	Project activity will include construction of a Natural Gas infrastructure (local piping, filtrate system, safety system, fueling, metering) inside the plant and adapting of the burners to consume Natural Gas.
Fuel switching may also 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 focused primarily on energy efficiency, the project activity falls under a Type II methodology.	The main purpose of the Project activity is fuel switching, not energy efficiency. The Project Activity aims at reducing emissions through fuel switching and efficiency gains/losses are negligible.
New facilities (Greenfield projects) and project activities involving capacity additions compared to the baseline scenario are only eligible if they comply with the related and relevant requirements in the General Guidance for SSC methodologies. The requirements concerning demonstration of the remaining lifetime of the replaced equipment shall be met as described in the General Guidance for SSC methodologies. If the remaining lifetime of the affected systems increases due to the project activity, the crediting period shall be limited to the estimated remaining lifetime, i.e. the time when the affected systems would have been replaced in the absence of the project activity.	The Project Activity will not include capacity additions or new facilities.
This methodology is not applicable to project activities that propose switch from fossil fuel use in the baseline to renewable biomass, biofuel or renewable energy in the project scenario. A relevant Type I methodology shall be used for such project activities that generate renewable energy displacing fossil fuel use. This methodology is also	The Project Activity will not propose to switch to biomass, biofuel or renewable energy. The Project Activity will not use waste gas.

not applicable to project activities involving the use of waste gas; these project activities might be eligible under AMS-III.Q.	
The facility may involve grid connected elemental processes however this methodology does not cover emission reductions on account of shift from use of grid electricity.	The Project Activity will not include any shift from use of grid electricity for involved grid connected elemental processes.
This category 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 boundary.	The Project Activity will include direct measure and record of fuel consumption (Natural Gas) and energy use/output (steam) within the project boundary.
Heat or electricity produced under the project activity shall be for on-site captive use and/or export to other facilities included in the project boundary. In case energy produced by the project activity is delivered to another facility, or facilities, within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered into specifying that only the facility generating the energy can claim emission reductions from the energy displacement.	The Project Activity will use the produced energy (steam) on site.
Regulations do not constrain the facility from using the energy sources cited in paragraph 1 before or after the fuel switch. Regulations do not require the use of low carbon energy source (e.g., Natural Gas or any other fuel) in the element processes.	There is not any regulation constraining the use of low carbon energy sources in the element processes. There is not any regulation constraining the facility to use any specific kind of energy sources. Nowadays, Heavy Oil is widely used in the country industries.
The project activity does not result in integrated process change. The purpose is to exclude measures that affect other characteristics of the process besides switch of energy sources e.g., operational conditions, type of raw material processed, use of non-energy additives, change in type or quality of products manufactured etc.	The Project Activity will not result in any change of integrated process.
Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO_2 equivalent annually.	Based on the historical data and plant capacity measures, in any year of the crediting period, emissions reduction resulting from the Project Activity will not exceed 60kt CO_2 equivalent annually. Enough evidences provided to DOE to prove the limit.

B.3. Description of the project boundary:

As per baseline methodology AMS-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. The boundary also extends to the industrial, commercial or residential facilities consuming energy generated by the system. Therefore the project boundary encompasses the gas pipeline from TBS to boilers, the boilers in the AmirKabir Agri Industrial Sugarcane Plant that affected by fuel switching, also the energy consumers as shown in Figure A.1, above. No leakage calculation is required by applied methodology (AMS-III.B., version 14).

Natural Gas consumption of the boilers requires construction of a Natural Gas infrastructure in the plant. This infrastructure is including the piping from TBS to boilers inside the plant, implementation of filtrate system, safety system, fuelling and metering system and boiler retrofitting to consume Natural Gas, and is constructed by AmirKabir Agri Industrial Company.

The following table shows the sources and gases included in the project boundary:

Table 5: Sources and gases considered in the baseline and project scenarios

	Source	Gas	Included ?	Justification / Explanation
Baseline	Heavy Oil combustion	CO_2	Yes	According to the methodology, only CO_2 emissions from fossil fuel combustion should be considered in the baseline scenario.
		CH_4	No	According to the methodology, methane and nitrous oxide emissions from fuel combustion are not included in the project boundary since these are considered as minor sources.
		N_2O	No	
Project activity	Natural Gas combustion	CO_2	Yes	According to the methodology, only CO_2 emissions from Natural Gas combustion should be considered in the project scenario.
		CH_4	No	According to the methodology, methane and nitrous oxide emissions from fuel combustion are not included in the project boundary since these are considered as minor sources.
		N_2O	No	

B.4. Description of baseline and its development:

As described in the methodology, the emission baseline is the current emissions of the facility. In the absence of the Project activity, AmirKabir Agri Industrial would be utilizing Heavy Oil for steam generation, which is the current situation. Under the current regulations, it is allowed to use Heavy Oil at the region and there is no regulation that requires the use of Natural Gas or any other fuel. Also, as shown

in the Section B.5 below, it is not economically attractive to switch fuel from Heavy Oil to Natural Gas. Therefore, the current situation of using Heavy Oil for steam generation is considered as baseline scenario for the Project Activity.
Emission reductions will be determined using actual data which will be monitored. The key variables and parameters used to calculate the emission reductions are as follows:

Table 6: Key variables and parameters

Variables & Parameters [1]	Data source
Quantity of Heavy Oil combusted in the boiler (before the project implementation)	AmirKabir Agri Industrial Co.
Quantity of Natural Gas combusted in the boiler (after the project implementation)	AmirKabir Agri Industrial Co.
Quantity of steam generated (before and after the project implementation)	AmirKabir Agri Industrial Co.
Net calorific value of the Natural Gas	NIGC [2]
Net calorific value of the Heavy Oil C	IPCC default value [3]
CO_2 emission factor of the Natural Gas	IPCC default value [3]
CO_2 emission factor of the Heavy Oil C	IPCC default value [3]

1) Details of each parameter are described in section B.6.2 and B.7.1.
2) National Iranian Gas Company.
3) Because accurate and reliable national data is not available, 2006 IPCC Guidelines for National Greenhouse Gas Inventories default values are to be used.

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

As described in section B.4 above, using Heavy Oil is very common in the region and there is no regulation that requires the use of Natural Gas or any other fuel. Therefore, regardless of energy supply security and environmental benefits, the use of fuel for steam generation is decided based on the economics. Without considering the incomes from CDM, the project activity could not be implemented because of following barrier;

Investment Barrier

To demonstrate the additionality, it might be noted that since the price of Natural Gas is higher than the Heavy Oil in Iran, fuel switching from Heavy Oil to Natural Gas, not only requires significant investment, but also needs additional fuel cost.
Early 2006, AmirKabir Agri Industrial Company started a feasibility study for fuel switching at the site. The results of study revealed that without CDM revenues, the investment is not economically attractive. Therefore, AmirKabir Agri Industrial Co. approved the fuel switching project condition to the CDM benefits. Additionally the company put significant non-monetary values on environmental benefits and energy supply security.

During the preparation of the PDD, project developers adjusted the feasibility study based on real investment data and 2005-2008 information which were collected from the plant. Table 7 shows the data

and results of feasibility study. As indicated in the table, NPV of the total cost in project scenario is higher than that of baseline scenario which means that the project activity is not economically attractive without CDM revenues. Thus in the absence of CDM, project activity could not be implemented.

Table 7: NPV Analysis

Description	Baseline Scenario (Heavy Oil)	Project Scenario (Natural Gas)
Initial Equipment Cost	0	6,924,000,000 Rial
Operation & Maintenance Cost	2,430,000,000 Rial/y	1,700,000,000 Rial/y
Fuel Consumption	55,649,269 lit/y	58,298,549 Nm3/y
Fuel Cost	135.30 Rial/lit	138.50 Rial/Nm3
Fuel Efficiency	85.80	90.52
Net Calorific Value of Fuel	38.703MJ/lit	35.018MJ/Nm3
NPV of the Total Cost	62,339 Million Rial	68,105 Million Rial

Notes:

- The cost of equipment in the project activity includes all costs spent by AmirKabir Agri Industrial for Natural Gas pipeline, construction and commissioning, also the burner retrofitting to utilize Natural Gas. It was indicated 15,000M Rial in the FSR, but as the realized cost of 6,942M Rial is more conservative in investment analysis, the realized cost is considered as the capital cost.
- Fuel consumption of the plant in baseline scenario, depends on the amount of sugarcane produced in the agricultural season and may vary year to year because of variation in weather (rainfall). The indicated amount is 3 years average Heavy Oil consumption prior to decision making.
- Fuel prices are based on the national tariffs in the year 2005-2006 as indicated in Energy Balance Survey from Ministry of Energy and Hydrocarbon Balance from Institute for International Energy Studies of Ministry of Petroleum of Iran in compliance with fuel receipts of the company.
- Fuel Transportation cost is based on the fuels transportation costs dedicated in the annual Energy Balance Survey. It is considered that the transportation distance of tankers is 230 km in average while the closest fuel supply terminal to the plant is Mahshahr with 130 km distance. Also the renovated Abadan Oil Refinery with 80km distance from the plant could supply major amount of Heavy Oil to plant in futures. In worst cases in winter time, because of lack of Heavy Oil in the region, small amounts shall be transported from Arak Oil Refinery (about 640km away) and/or Shiraz Oil Refinery (about 610 km away). Very conservatively, 230 km distance for tankers is assumed with a price of 185.64 rials/ton-km[1].
- Fuel efficiency of the boiler in baseline scenario is the average efficiency of the boiler during three years prior to project implementation. Fuel efficiency of project scenario is from the nameplate of boiler (maximum value). Fuel efficiency is used only to evaluate the amount of Natural Gas consumption in the project scenario.
- The operation and maintenance cost in the project scenario, is considered as an order of 70% of the baseline scenario. The assumption is based on the experience of AmirKabir Agri Industrial and the difference is because of least problems using Natural Gas in boiler like coking/sediments.
- Net Calorific Values for Heavy Oil is adopted from the 2006 IPCC guidelines for GHGs emission inventory, while for Natural Gas, it is adopted from National Iranian Gas Company (NIGC).

[1] Hydrocarbon Balance, table 4.25, page 120, Institute for International Energy Studies(IIES), 2008

- A discount rate of 15% is applied to NPV analysis. This discount rate is based on the Term Investment Deposit Rate published by Central Bank of Iran[2], also satisfying the Expected Rate of Return in Facilities (industrial sector) and the inflation rate during years 2001-2005.
- Life time of project activity is 20 years which is relevant to the lifetime of boiler.
- The residual value for new equipment at the end of the lifetime of the project activity is negligible.

To consider also the variations on critical assumptions, the sensitivity analysis is conducted for the project scenario. Guidance on the Assessment of Investment Analysis defines critical assumptions as those which constitute more than 20% of total project costs or total project revenue and reasonable variation shall be defined at least as a range of ±10%.
A scrutiny of the project cost reveals that equipment cost, O&M cost and also fuel cost, account for more than 20% of the project cost, and shall be subjected to variation.
Project investment cost is adjusted based on real investment data and there is no variation on that. Additionally and more conservatively, -10% of variation is applied on investment cost.
Based on historical data, O&M cost increased with a rate of 16% in average in three years following to decision making. So the O&M cost is subjected to ±20% variation conservatively.
Natural Gas price get increased with an average rate of 3% during same period[3]. So the Natural Gas Tariff subjection to the ±10% variation is reasonable.
Heavy Oil price is fixed since 2004[4], but the transportation costs get increased[5] with an average rate of 7%. So total fuel cost is increased with an average rate of about 2%. Thus +10% variation of baseline fuel cost is reasonable.
The impact of the variations on these parameters on the NPV of total cost, have been worked out and the results are presented in Table 8.

1) Sensitivity analysis I: Initial equipment cost for the project scenario is 10% lower than expected.
2) Sensitivity analysis II: O&M costs for baseline and project scenario is 20% lower than expected.
3) Sensitivity analysis III: O&M costs for baseline and project scenario is 20% higher than expected.
4) Sensitivity analysis IV: Natural Gas price is 10% lower than expected.
5) Sensitivity analysis V: Natural Gas price is 10% higher than expected.
6) Sensitivity analysis VI: Heavy Oil price is 10% higher than expected.
7) Sensitivity analysis VII: Discount rate varies 10 ~ 20%, range of term investment deposit rate.

Table 8: Sensitivity analysis

Description	NPV of total cost (Million Rial)	
	Baseline Scenario	Project Scenario
Base case	62,339	68,105
Sensitivity analysis I	62,339	67,412
Sensitivity analysis II	62,339	65,977
Sensitivity analysis III	62,339	70,233
Sensitivity analysis IV	62,339	63,051

[2] www.cbi.ir/page/2360.aspx

[3] 2005-2006 Energy Balance, table 3-44, Ministry of Energy, 2007

[4] 2005-2006 Energy Balance, table 2-50, Ministry of Energy, 2007

[5] 2005-2006 Energy Balance, table 2-27, Ministry of Energy, 2007

Sensitivity analysis V	62,339	73,159
Sensitivity analysis VI	67,052	68,105
Sensitivity analysis VII-1 (Discount rate 10%)	84,790	90,139
Sensitivity analysis VII-2 (Discount rate 20%)	48,498	54,521

As shown in the above table, NPV of the total cost in project scenario is always higher than that of baseline scenario confirming the robustness of economical attractiveness of baseline scenario. So the CDM incomes play a main role in the attractiveness of the fuel switching. With the confidence that the project activity is eligible for CDM, AmirKabir Agri Industrial Company, decided to implement the project activity.

Additionally, the timeline of project implementation together with CDM implementation timeline as stated in following tables, shows that the CDM potential has been assessed and considered.

Table 9: Timeline of the project implementation

Date	Action Taken	Remark
Jan. 2006	Feasibility Study	Feasibility Study was done by AmirKabir Agri Industrial Co. included the CDM potential assessment.
Feb. 2006	Decision making by Managing Director	Fuel switching approved, considering the CDM incomes
Sep. 2007	Contract with Chelvir Izeh Company has made by AmirKabir Agri Industrial Company.	Contract included design, procurement and construction of pipeline from TBS to boilers.
Dec. 2007	Contract with boiler retrofitter	A contract with Home Sanat Tehran company to retrofit boilers to utilize Natural Gas is signed.
Sep. 2009	Test run of boiler with Natural Gas	Operation ceremony in presence of head of Environment Department of Iran in January 2010

Table 10: Timeline of the CDM cycle

Date	Action Taken	Remark
01/2006	CDM incomes considered in feasibility study following to a hint from main shareholder of company	CDM incomes played a key decisive role in feasibility study and economical attractiveness
02/2006	Decision made to implement the project relying on CDM incomes	CDM incomes was the condition for this decision making
09/2007	Project Started	Contract signed with Subcontractor, Chelvir Izeh Co.
12/2008 – 01/2009	AmirKabir Agri Industrial Co. hold CDM workshops	In close collaboration of DNA
01/2009	CDM Development Proposal proposed by CDM Developers	Including Mehr Renewable Energies Co.
03/2009	CDM Developer chosen	Mehr Renewable Energies awards the consultancy services for CDM development

07/2009	CDM Developer nominated as focal point to DNA	Mehr Renewable Energies nominated as focal point of project to DNA
08/2009	CDM Developer contract finalized	After a long discussion on terms of contract, it is finalized on 15th August
09/2009	PIN submitted to DNA	PIN submitted to DNA for issuance of Letter of No-Objection (LNO). LNO has issued by letter no. 88-DNA-248 dated 20 September 2009.
10/2009	Validation proposal received	KFQ
03/2010	Validation contract finalized	KFQ

As shown in the above tables, AmirKabir Agri Industrial Company has considered the incentives from CDM before the start of project activity and has taken continues and real actions to secure CDM.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

Baseline Emissions

The emission baseline is the current emissions of the facility expressed as emissions per unit of output. Baseline emissions shall be determined as follows:

$$BE_y = EF_{BSL} * Q_{PJ,y}$$

Where:

BE_y	Baseline emissions in the project activity in year y (tCO_2e)
EF_{BSL}	Emission factor for the baseline situation (tCO_2/MWh)
$Q_{PJ,y}$	Net energy output in the project activity in year y (MWh)

The emission factor in the baseline situation (EF_{BSL}) is the coefficient for the fossil fuel used in the baseline expressed as emissions per unit of output.

$$EF_{BSL} = \sum FC_{i,j,BL,y} * NCV_j * EF_{CO2,j} / Q_{BSL,j}$$

Where:

EF_{BSL}	Emission factor for the baseline situation (tCO_2/MWh)
$FC_{i,j,BL,y}$	Amount of fuel j consumed by the element process i during the year y operating at the baseline energy scenario (mass or volume unit)
NCV_j	Net calorific value of the fuel type j (kJ/unit)
$EF_{CO2,j}$	CO_2 emission factor of the fuel type j (tCO_2/kJ)

$Q_{BSL,j}$ Net energy generated in the element process *j* in the baseline situation during the corresponding period of time for which the total fuel consumption was taken.

Since only Heavy Oil is consumed for steam generation at the baseline situation, EF_{BSL} is calculated as follows:

$EF_{BSL} = FC_{BSL} * NCV_{BSL} * EF_{BSL,CO2} / Q_{BSL}$

Where:

FC_{BSL} Amount of Heavy Oil consumed at the baseline energy scenario (mass or volume unit)

NCV_{BSL} Net calorific value of the Heavy Oil (kJ/unit)

$EF_{BSL,CO2}$ CO_2 emission factor of the Heavy Oil (tCO_2/kJ)

Q_{BSL} Net energy generated in the baseline situation during the corresponding period of time for which the total fuel consumption was taken.

Project Activity Emissions

Project activity emissions consist of those emissions related with the use of fossil fuel after the fuel switch. Project emissions are determined as follows:

$PE_y = FC_{NG,y} * EF_{NG,CO2} * NCV_{NG,y}$

Where:

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

$FC_{NG,y}$ Amount of Natural Gas consumed for captive energy generation in the project activity in year *y* (mass or volume unit)

$EF_{NG,CO2}$ CO_2 emission factor for Natural Gas (tCO_2/TJ)

$NCV_{NG,y}$ Net calorific value for the Natural Gas in year *y* (TJ/mass or volume unit)

Leakage

No leakage calculation is required.

Emission Reductions

The emission reduction achieved by the project activity will be calculated as the difference between the baseline emissions and the project emissions.

$ER_y = BE_y - PE_y$

Where:

ER_y Emission reductions in the year *y* (tCO_2e)

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

Data / Parameter:	**FC_{BSL}**
Data unit:	Metric ton
Description:	Quantity of Heavy Oil combusted in the baseline situation
Source of data used:	AmirKabir Agri Industrial Company
Value applied:	171,382
Justification of the choice of data or description of measurement methods and procedures actually applied :	3 years data prior to the project implementation from October 2005 to September 2008 is used. The detailed data is presented in annex 3.
Any comment:	

Data / Parameter:	**NCV_{BSL}**
Data unit:	TJ/Gg
Description:	Net calorific value of Heavy Oil
Source of data used:	IPCC default value
Value applied:	40.4
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since the accurate and reliable local or national data is not available, default value from 2006 IPCC Guidelines for National Greenhouse Gas Inventories is used. (table 1.2)
Any comment:	

Data / Parameter:	**$EF_{BSL,CO2}$**
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor of Heavy Oil
Source of data used:	IPCC default value
Value applied:	77.4
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since the accurate and reliable local or national data is not available, default value from 2006 IPCC Guidelines for National Greenhouse Gas Inventories is used. (table 1.4)
Any comment:	

Data / Parameter:	**Q_{BSL}**
Data unit:	MWh
Description:	Net energy generated in the baseline situation
Source of data used:	AmirKabir Agri Industrial plant
Value applied:	1,652,256.5
Justification of the choice of data or	3 years data prior to the project implementation from October 2005 to September 2008 is used. AmirKabir Agri Industrial plant produces superheated

description of measurement methods and procedures actually applied :	steam at 30.6 kg/cm^2 (gauge) and 380ºC. The temperature of the feed water is 140 ºC. The enthalpy of the superheated steam and feed water with these properties are 3,182.9 kJ/kg and 591.5 kJ/kg respectively, according to the steam table (Spirax Sarco: http://www.spiraxsarco.com/resources/steam-tables.asp). The detailed data is presented in annex 3.
Any comment:	

Data / Parameter:	**$EF_{NG,CO2}$**
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor of the Natural Gas
Source of data used:	IPCC default value
Value applied:	56.1
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since the accurate and reliable local or national data is not available, default value from 2006 IPCC Guidelines for National Greenhouse Gas Inventories is used. (table 1.4)
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

Baseline Emissions:

$EF_{BSL} = FC_{BSL} * NCV_{BSL} * EF_{BSL,CO2} / Q_{BSL}$

= 171,382 (M ton) × 0.001 (Gg/M ton) × 40.4 (TJ/Gg) × 77.4 (tCO_2/TJ)/ 1,652,256.5 (MWh)

= 0.3243 (tCO_2/MWh)

$BE_y = EF_{BSL} * Q_{PJ,y}$

= 0.3243 (tCO_2/MWh) × 550,752.16 (MWh)

= 178,609 (tCO_2)

Quantity of steam ($Q_{PJ,y}$) is estimated for ex-ante purpose based on the historical data of steam generation.

Project Emissions:

$PE_y = FC_{NG,y} * EF_{NG,CO2} * NCV_{NG,y}$

= 62,470,750 (Nm^3) × 56.1 (tCO_2/TJ) × 35018 × 10^{-9} (TJ/Nm^3)

= 122,724 (tCO_2)

Quantity of Natural Gas consumption in the project scenario ($FC_{NG,y}$) is estimated for ex-ante purpose by energy balance based on the historical Heavy Oil consumption, NCV of Heavy Oil and Natural Gas, and boiler efficiency at baseline and project scenarios. Boiler efficiency of baseline scenario is the average of

boiler efficiency during three years prior to project implementation (85.80%). Boiler efficiency of project scenario is from nameplate of boiler (90.52% - maximum value) as conservative approach.

Emission Reductions:

$ER_y = BE_y - PE_y$

= 178,609-122,724

= 55,885 (tCO_2/year)

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

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
Year 1	122,724	178,609	0	55,885
Year 2	122,724	178,609	0	55,885
Year 3	122,724	178,609	0	55,885
Year 4	122,724	178,609	0	55,885
Year 5	122,724	178,609	0	55,885
Year 6	122,724	178,609	0	55,885
Year 7	122,724	178,609	0	55,885
Year 8	122,724	178,609	0	55,885
Year 9	122,724	178,609	0	55,885
Year 10	122,724	178,609	0	55,885
Total	1,227,240	1,786,090	0	558,850

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

B.7.1 Data and parameters monitored:

Data / Parameter:	$FC_{NG,y}$
Data unit:	Nm^3
Description:	Quantity of Natural Gas consumption in the project boilers during the year y
Source of data to be used:	On-site measurement
Value of data (applied for ex-ante calculation of emission reductions)	62,470,750
Description of	Measured continuously by meter and recorded.

measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	The meters will be calibrated annually according to the company procedures. Meter readings will be compared to gas sales receipts.
Any comment:	Data shall be measured at the plant for cross check. Sales receipts shall be used for verification. Data will be archived until two years following after the end of the crediting period.

Data / Parameter:	$NCV_{NG,y}$
Data unit:	TJ/Nm^3
Description:	Net Caloric Value of Natural Gas in year y
Source of data to be used:	National Iranian Gas Company (NIGC)
Value of data (applied for ex-ante calculation of emission reductions)	35018×10^{-9}
Description of measurement methods and procedures to be applied:	The accurate and reliable national data will be used. The value received from National Iranian Gas Company as the national and main gas provider of Iran. Based on Indicative Simplified Baseline and Monitoring Methodology for Selected Small Scale CDM Project Activity Categories, para. 12, this data will be re-checked with (measured by) NIGC every year.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	$Q_{PJ,y}$
Data unit:	MWh
Description:	Total energy of steam generated by Natural Gas in the project boilers during the year y
Source of data to be used:	On-site measurement
Value of data (applied for ex-ante calculation of emission reductions)	550,752.16
Description of measurement methods and procedures to be applied:	Measured continuously by meter and recorded.
QA/QC procedures to be applied:	The meters will be calibrated annually according to the company procedures.
Any comment:	

Data / Parameter:	$\varepsilon_{PJ,y}$
Data unit:	%
Description:	Energy efficiency of boiler during the year y

Source of data to be used:	Calculated using the measured data
Value of data (applied for ex-ante calculation of emission reductions)	90.52
Description of measurement methods and procedures to be applied:	The energy efficiency of the boiler will be calculated by the direct method (dividing the net heat generation by the energy content of the fired fuel) at least quarterly.
QA/QC procedures to be applied:	The meters used for monitoring of the relevant parameters (steam generation and fuel consumption) will be calibrated annually according to the company procedures. Once the erroneous measurement or malfunction is detected, corrective actions will be taken by AmirKabir Agri Industrial.
Any comment:	The value of data applied above (90.52%) is from the nameplate of the boiler. For the monitoring during the crediting period, the direct method (dividing the net heat generation by the energy content of the fired fuel) will be used for the monitoring of the efficiency.

B.7.2 Description of the monitoring plan:

Project Proponent will implement to monitor the emission reductions generated by the project activity. Project Proponent will form an operational and management team, which will be responsible for the monitoring of all the required data. This team will be composed by the project manager, operation and measurement department, and maintenance department. Company has been ISO 9001 certified, on which all the project quality management activity will be based.
Figure B.1 outlines the operational and management structure.

Responsibility of operation and measurement department:

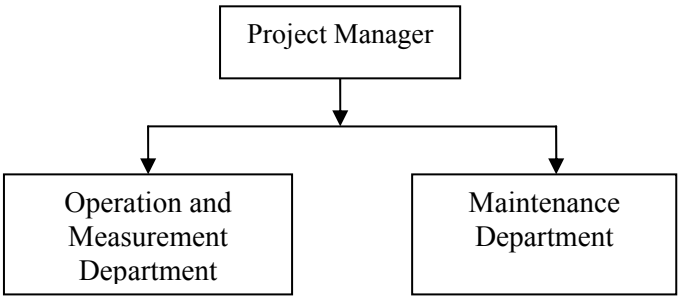
1. Monitors continuously and records daily the different parameters:
   - Quantity of Natural Gas combusted in the project boilers during the year, and
   - Quantity of steam generated by Natural Gas in the project boilers during the year.
2. Records and archives data using paperwork and computer software. The computerized records will serve as back-up purpose and archived at Project site. All the data will be kept at least for 2 years after the end of crediting period.
3. Compiles and analyzes the monthly monitoring reports and cross-checks the monitoring report data against Natural Gas sales receipts each period of gas receipts.
4. Elaborates an estimate of emission reduction in an Emission Reduction Monitoring Report annually.
5. Ensures that operators are appropriately trained and assigned for monitoring/checking the different parameters/meters with courses and an instruction manual.
6. Reviews the instruction manual for its effectiveness and improvement. This manual will be made available during verification.

Responsibility of maintenance department:

1. Ensures that all meters installed at the plant are calibrated according to the company procedures.
2. Elaborates the Calibration Report annually. The Calibration Report is composed listing all CDM-related instruments, their details, calibration status and expected error.

Responsibility of project manager:

1. Manages and supervises all monitoring activities under the project.
2. Review and approve the Emission Reduction Monitoring Report with all its attachments that will be verified by the DOE.
3. Subjects the Calibration Report Status to internal audit and provides as an attachment in the annual Emission Reduction Monitoring Report, for verification.



B.1 Operational and management structure for monitoring the project activity

	Tasks description	Operator	Operation and Measurement Manager	Maintenance Department	Project Manager	CDM Consultant
Monitoring activity						
1	Recording of monitored data	✓				
Quality Assurance & Quality Control						
2	Verification of data monitored (consistency and completeness)		✓			
3	Ensuring adequate training of staff		✓			
4	Ensuring adequate maintenance			✓		
	Ensuring calibration of monitoring instruments			✓		
5	Data archiving: ensuring adequate storage of data monitored (integrity and backup): 2 years after the end of the crediting period		✓			
6.	Identification of non-conformance and corrective/preventive actions and monitoring plan improvement		✓			
7	Emergency procedures		✓			
8	External audit					✓
Calculation of GHG emission reductions and reporting						
9	Processing of data and calculation of emission reductions				✓	
10	Monitoring report: management review of monitoring report (internal audit)				✓	

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

The baseline study completed on 28 February 2010 by Mehr Renewable Energies Co. Ltd. The contact details of Mehr Renewable Energies Co. Ltd. are as follows;

Mehr Renewable Energies Co. Ltd.
No. 6, Keyvan alley,
Roudbar Gharbi str., Mirdamad blvd.
Tehran, Iran
Tel: +98 21 2291 5989
Fax: +98 21 2222 4560
Email: info@mehrenergy.com

Mehr Renewable Energies Co. Ltd. is the CDM developer and project participant to this project and will be the focal point for the CDM activity described in this PDD.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

22 Sep. 2007 (Date of contract with Chelvir Izeh Company)

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

20 years

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

The project activity will make use of fixed crediting period.

C.2.1. Renewable crediting period

Not applicable

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

Not applicable

C.2.1.2. Length of the first crediting period:

Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

01.03.11 or the date of registration, whichever later

C.2.2.2. Length:

10 years

SECTION D. Environmental impacts

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

EIA is not required based on local regulation and requirements of Department of Environment[6]. However, the sugarcane plant, in which the fuel switching is occurring, has an approved EIA for whole plant.

In actual condition, the project activity will help to improve local air quality and will improve environmental condition as well as mitigate climate change. Also SOx, NOx and PMs emission will be decreased considerably by this project activity.

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

It is expected that there would not be negative environmental affect with the project activity.

SECTION E. Stakeholders' comments

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

According to Iranian law in force, the project activities in AmirKabir Agri Industrial Co. do not require an environmental impact assessment. As the project only involves the switch to natural gas in an existing facility, no stakeholders were significantly affected. In fact, the main stakeholder of the project is AmirKabir Agri Industrial Co. However, in an effort to public consultation and to build a culture of social

[6] Environmental Regulation and Standards, Section I, Article 2, Page 32, Department of the Environment, August 2002

and environmental responsibility, the company has arranged a survey of stakeholders' opinion through distributed questionnaires.
In general, the survey established the extent of:

1. The awareness of the project (concerns)
2. The understanding of the project purpose
3. Suggestions of environmental protection measures
4. Environmental impact of the project
5. Economical impact of the project
6. Impact on environmental community by the CDM
7. Impact on the socio-economic condition of local community by the CDM

The survey has been done amongst most influenced parties by the project activities, including AmirKabir Agri Industrial staff and workers, Gas Company, neighbouring farms and villages, environment department of nearby city, climate change officer and research institute of Ministry of Agriculture.
The Iranian Designated National Authority (DNA) for the CDM requires the compulsory invitation of selected stakeholders to comment the PDD sent to validation in order to provide the letter of approval. DNA invited the comments from local stakeholders when validation started.
The invited local stakeholders are listed below:
- Department of Environment
- Ministry of Housing and Urban Development
- Ministry of Petroleum
- Ministry of Energy
- Ministry of Industries and Mines
- Ministry of Jihad Agriculture
- Ministry of Road and Transportation (Meteorological Organization)
- Ministry of Economic Affairs and Finance
- Ministry of Defence
- Ministry of Information and Communications Technology
- Ministry of Health and Medical Education
- Ministry of Foreign Affairs
- Ministry of Interior (Municipalities and Rural Management Organization)
- Ministry of Science, Research and Technology
- President Deputy Strategic Planning and Control

E.2. Summary of the comments received:

All of the stakeholders are in favour of the Project activity considering its environmental and the socio-economic effects. Nonetheless, all effects on the local environment are considered to be positive as the combustion of natural gas is cleaner. There were no adverse comments in regards to the Project activity.

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

As stated above, there were no negative comments from local stakeholders in regards to the Project activity.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	AmirKabir Agri Industrial Company
Street/P.O.Box:	Km 45, Ahvaz – Khorramshahr Road – P.O.Box 61365-137
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E-Mail:	info@ak-sugarcane.ir
URL:	www.ak-sugarcane.ir
Represented by:	Mohammad Fathi Makvand
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Salutation:	Mister
Last Name:	Fathi Makvand
Middle Name:	
First Name:	Mohammad
Department:	
Mobile:	
Direct FAX:	+98 611 3432 014
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Represented by:	Frank Rittner
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Direct tel:	+41 44 585 39 30
Personal E-Mail:	fr@qca.ch

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

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

Annex 3

BASELINE INFORMATION
Fuel consumption and steam generation

	amount of steam (metric ton)	Heavy Oil consumption (metric ton)
Oct-05	46,232	3,541
Nov-05	106,727	8,219
Dec-05	95,862	7,302
Jan-06	73,313	5,574
Feb-06	73,249	5,631
Mar-06	89,309	6,751
Apr-06	85,237	6,566
May-06	63,958	5,059
Jun-06	39,150	2,961
Jul-06	0	0
Aug-06	0	0
Sep-06	0	0
Oct-06	24,856	1,900
Nov-06	108,760	8,183
Dec-06	99,044	7,368
Jan-07	50,685	3,743
Feb-07	85,911	6,300
Mar-07	138,795	10,223
Apr-07	145,084	10,644
May-07	89,616	6,569
Jun-07	68,251	4,983
Jul-07	17,784	1,309
Aug-07	0	0
Sep-07	0	0
Oct-07	26,904	2,006
Nov-07	123,451	9,110
Dec-07	109,234	8,053
Jan-08	92,368	6,843
Feb-08	91,240	6,744
Mar-08	139,431	10,251
Apr-08	106,489	7,916
May-08	75,779	5,519
Jun-08	28,613	2,114
Jul-08	0	0
Aug-08	0	0
Sep-08	0	0
Total	2,295,332	171,382

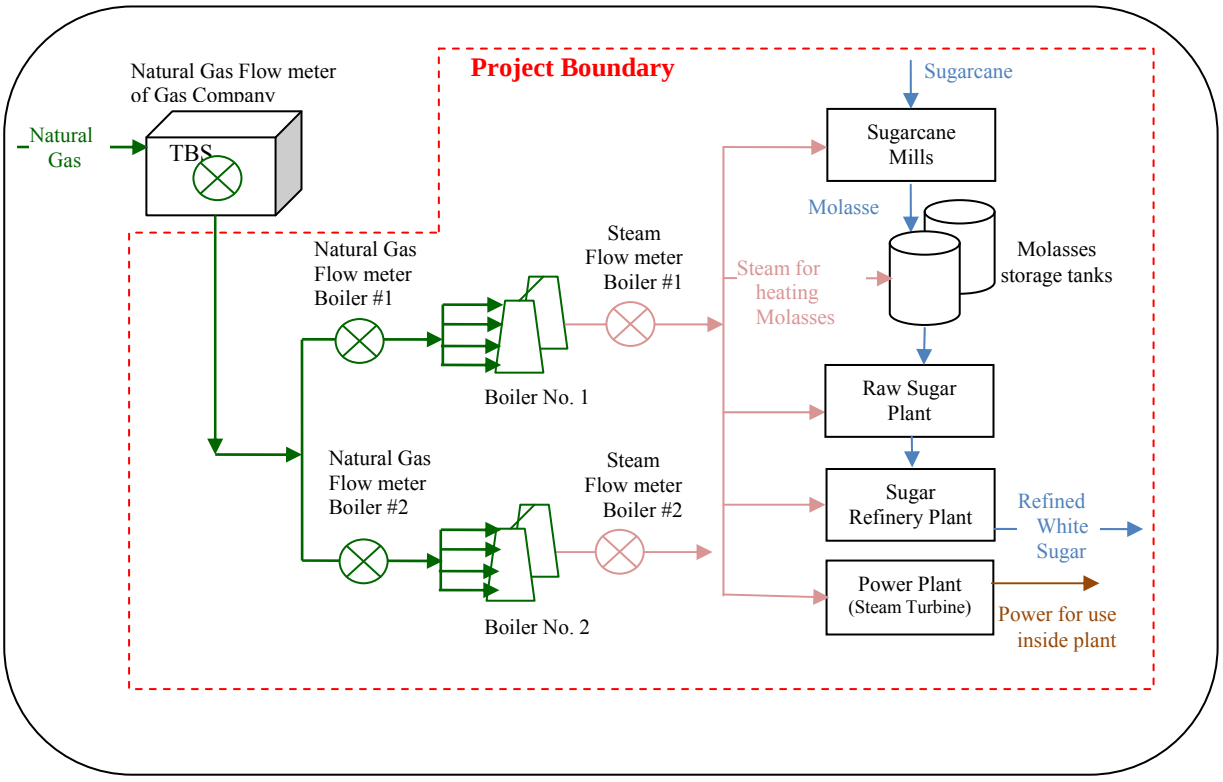
Annex 4

MONITORING INFORMATION

Monitoring refers to the collection and archiving of all relevant data necessary for determining the baseline, measuring anthropogenic emissions by sources of greenhouse gases (GHG) within the project boundary of a CDM project activity and leakage. It includes developing suitable data collection methods and data interpretation techniques for monitoring and verification of GHG emissions with specific focus on specific energy production parameters.

Data Monitoring

The monitoring methodology involves amongst other the monitoring of the generated steam and consumed Natural Gas by using relevant flow meters. Two Natural Gas flow meters on the Natural Gas feeding line to the boilers (branches for four burners of every boiler is after flow meters) and two steam flow meters on steam out put line of the boilers are to be monitored.
The purpose of the monitoring procedure will be to support and manage the monitoring of project performance indicators for determining project outcomes, greenhouse gas (GHG) emission reductions. The project employs latest state of the art monitoring and control equipment that measure, control and record key parameters continuously.
Additionally measured data will be recorded in paperwork through Daily Recording Forms, Monthly Reporting Forms and Annual Reporting Forms, following to Procedure for Recording the CDM Related Information (document number I.E.2.WI.01/00, internal procedure according to ISO/IMS system of AmirKabir Agri Industrial Company).



Ensuring adequate maintenance and calibration of monitoring instruments

- Specific maintenance, repair or replacement of monitoring equipment will be recorded and will describe the time and action undertaken.
- The calibration will occur at intervals determined on the basis of instrument manufacturers' recommendations, stability, purpose, usage and history of repeatability. Recalibration should be performed whenever an event occurs that places the accuracy of the instrument in doubt.
- Meters are delivered with a certificate of conformity and are not calibrated after installation. They will be calibrated annually based on the company procedures. To follow the Guidelines for Assessing Compliance with the Calibration Frequency Requirements, the company decided to calibrate all CDM related instruments at least once a year.
- Last calibration certificates and next calibration date will be provided during periodic verification
- Defect, repair or change of monitoring equipment will be recorded.

Data archiving

The monitored data will be kept for a minimum of 2 years after the end of the crediting period in forms of paper documents and electronic files.

Identification of non-conformities

A verification of inconsistencies of the data recorded will be performed periodically. Any discrepancies (completeness, calculation errors, transcription errors, instrument calibration issues) will be analyzed and actions taken to correct the problem.

Ensuring adequate training of staff

- All new staff will undergo “on job training” covering the monitoring requirements at least once a year. Any of the staff may receive any specific training during the year.
- The monitoring plan will be made available to each staff involved in the monitoring in the local language. A copy is located in the control room at the site.
- Type of training required will be identified from training need analysis conducted annually. The record of training and awareness should be kept for at least 2 years after the crediting period.
- During the training, staffs are required to sign training attendance list.
- Required training for all staff will be identified from Training Need Analysis conducted annually. The record of training and awareness will be kept for at least 2 years after the crediting period.

Regular meetings will be organized to ensure that the personnel are aware of the relevance and importance of its activities and how it is contributing to the achievement of the quality monitoring plan.