

**MENA Region
Carbon Finance Assist Program**

**Support to the development of CDM
activities in Jordan**

**Technical Assistance for the
Greater Amman Municipality
GAM**

Final Mission Report

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ABBREVIATIONS

AMDP	: Amman Master Development Plan
BRT	: Bus Rapid Transit system
CDM	: Clean Development Mechanism
CER	: Certified Emissions Reduction
CF	: Carbon Finance Unit – World Bank
CFL	: Compact Fluorescent Lamps
CNG	: Compressed Natural Gas
CPA	: CDM Project Activity
DBOT	: Design, Build, Operate and Transfer
DNA	: Designated National Authority
EB	: CDM Executive Board
EIA	: Environment Impact Assessment
ER	: Emissions Reduction
ERPA	: Emission Reduction Purchase Agreement
GAA	: Greater Amman Area
GAM	: Greater Amman Municipality
GHG	: Green House Gases.
GoJ	: Government of Jordan
GWh	: Giga Watt hour (10^9 Watt hour)
HPS	: High Pressure Sodium lamps.
IL	: Incandescent Lamps.
IRR	: Internal Rate of Return
JBC	: Jordan Biogas Company Lmt.
JD	: Jordanian Dinar
JEPCO	: Jordanian Electric Power Co. ltd.
KP	: Kyoto Protocol
kWh	: kilo Watt hour (10^3 Watt hour)
LEDs	: Light Emitting Diodes
LFG	: LandFill Gas
LPG	: Liquefied Petroleum Gas
m ²	: Square meter

m ³	: Cubic meter
MEMR	: Ministry of Energy and Mining Resources
MENA	: Middle East and North Africa region
MoU	: Memorandum of Understanding
MVL	: Mercury Vapor Lamps.
MW	: Mega Watt (10 ⁶ Watt)
MWh	: Mega Watt hour (10 ⁶ Watt hour)
NERC:	: National Energy Research Centre
NG	: Natural Gas
NGV	: Natural Gas Vehicles
PDD	: Project Design Document
PIN	: Program Idea Note
PoA	: Program of Activity
RE	: Renewable Energy
REEF	: Renewable Energy and Energy Efficiency Fund
RRT	: Rail Road Transit system
RSS	: Royal Scientific Society
SD	: Sustainable Development
SWH	: Solar Water Heaters
TORs	: Terms Of Reference
UNFCCC	: United Nations Framework Convention on Climate Change
W	: Watt
WB	: World Bank
WBI	: World Bank Institute
WWTP	: Waste Water Treatment Plant

Currency exchange rate:

1 JD = 1,412 \$

EXECUTIVE SUMMARY

1- Amman city is managed by the Greater Amman Municipality (GAM) governed by a City Council composed of 68 members working within 14 committees and headed by the Mayor of Amman. It serves around 40% of Jordan population (2.3 millions) and its mandate extends on more than 1 700 km².

2- GAM has developed recently an ambitious Master Development plan for Amman city based on an innovative approach to metropolitan, urban and community planning. It has been established with the objective of a sustainable urban development of the city ensuring a high quality of life to its residents, a minimum impact on the environment and an optimal use of local and renewable energy resources.

3- In this perspective, GAM intends to develop, in collaboration with the World Bank (WB), the different eligible CDM projects of Amman's Master Development plan under a city wide CDM program. When approved by the CDM Executive Board, this new approach is expected to set an example of a CDM driven sustainable development of cities in the region and in the world.

4- The World Bank Institute, responsible for the CF-Assist program management, has hired Dr. Abdelmourhit Lahbabi, as short term consultant, to provide technical assistance to assess the CDM city wide programmatic approach potential in the Greater Amman Municipality (GAM) and to develop the Program Idea Note (PIN) for the most promising identified CDM Projects Activities (CPAs).

5- Two missions to Amman were organized from April 15 to April 21, 2009 and from July 03 to July 10, 2009. The first field mission has helped screen most promising projects activities for the CDM program's CPAs development. The second mission focused on meetings with the stakeholders concerned with the targeted CPAs.

6- Meetings were held during the field missions with Mr. Ammar Gharaybah, Amman City manager; GAM's concerned staff, the DNA at the Ministry of Environment, Ministry of Energy and Mineral Resources, Amman Institute, Royal Scientific Society, National Energy Research Centre, Jordanian Electric Power Co. Ltd., Jordan Water Company Miyahuna, Jordan Biogas Company Lmt as well as with consultants working on different GAM's projects (voir complete list in annexe C).

7- The meetings with the concerned stakeholders focused on potential CPAs development and on the required data/information gathering. Special attention was given to the concept and the scope of potential CPAs, objectives and projects status, expected implementation schedule, cost and financing, potential emissions reduction and projects' CDM additionality.

8- A CDM capacity building workshop was organized for GAM personnel during the first field mission. The workshop presentations provided a general overview on the national, regional and international CDM contexts and covered the following topics: Climate Change and CDM, State and perspectives of Carbon market, CDM cycle, PINs and PDD development, methodologies, additionally concept etc.

Special attention was given during the presentations to CDM projects examples in sectors pertinent to GAM's PoA development: transport, wind energy, solar energy, energy efficiency, efficient lighting and waste.

9- The mission has helped identify promising CDM activities that can be developed in the framework of Amman's urban development plan and has defined a city wide CDM PIN comprising the selected CDM projects. Overall six CPAs were developed:

- ✚ Wind farm for GAM's electricity needs;
- ✚ Replacement of Incandescent Lamps by CFLs program :
- ✚ Efficient street lighting in the Greater Amman Area (GAA) ;
- ✚ Wide spread use of SWH for households in the GAA ;
- ✚ New slaughter house project: capture of the biogas of the waste water treatment plant and electricity generation ;
- ✚ Optimal transport system: Bus Rapid Transit and Rail Road Transit systems - Use of natural gas for vehicles.

10-The six identified projects were analyzed for their CDM development feasibility with regard to the type of the planned activities, the baseline scenario, the additionality, the existence of a CDM approved methodology and the expected emissions reduction potential. The proposed CDM projects are all located in the Greater Amman Area and they are within the mandate of GAM. However it is recommended to implement the renewable energy and energy efficiency projects in close collaboration with the RSS, the NERC and the MEMR.

11- The identified CDM projects were developed as CPAs and integrated to a city wide CDM program for Amman. A detailed Program Idea Note (PIN) was developed for the proposed program in conformity with the terms of reference of the mission. The PIN of Amman's city wide CDM program is provided in paragraph 5 of the report.

12- It should be noted that most of the identified CPAs are at the concept idea stage. The technical feasibility studies for the identified projects are underway or planned for the short term. The assumptions made in the PIN should be validated and the ERs calculations refined once the feasibility studies done and the projects concepts fully determined. The results of these studies will help also better assess the investment required and establish the projects' detailed financial analysis.

13-.The required investment and the expected ERs of the program CPAs are summarized in the following table. Overall the program is expected to generate an average of 560 000 t CO₂/year post-2012.

CPA N°	Title	Investment M\$	Expected first crediting year	Expected ERs first 10 years period tCO2	Yearly Average CERs
1	Wind farm for GAM's electricity needs	72	2012	775 260	77 526
2	Replacement of Incandescent Lamps by CFL program	5,7	2012	413 129	41 313
3	Efficient street lighting in the Greater Amman Area (GAA).	9,15	2011	115 000	11 500
4	Wide spread use of SWH for households in the Greater Amman Area (GAA).	43	2012	255 000	25 500
5	New slaughter house project: capture of the biogas of the WWTP and electricity generation	45,4	2012	31 480	3 148
6	Optimal transport system: BRT/RRT systems - Use of CNG for vehicles	2 650	2012	4 014 400	401 440
Total		2 825	2011	5 604 269	560 427

1- TASKS OF THE MISSION

As specified in the mission terms of reference (see annexe A), the tasks assigned to the mission can be summarized as follows:

- Development of a set of criteria for assessment of projects for further development. Criteria include but are not limited to readiness of GAM to implement, financing availability, approved methodology, expected implementation / construction / operation date, etc.
- Assessment of the Greater Amman Municipality services and investment plans for the feasibility of a city wide CDM program, based on the criteria defined above.
- Assessment of renewable energy (solar, wind), energy efficiency, wastewater, and transport sectors. Identify sectors and projects with CDM potential and develop a pipeline of CPAs (CDM project activities) based on Program of Activities (PoA) approach.
- Based on the pipeline developed and identified, determine the most eligible (prioritize) CDM project activities that can be considered potential candidate and prepare a list of data / information / checklist that needs to be prepared and provided by GAM, which should include but not limited to the scope and the objectives of the CPA; the cost estimate and financing scheme, implementation schedule, the institutional arrangements and implementing entities etc. in order to validate the feasibility of the proposed CPAs.
- Validate the selected potential CPAs, and elaborate the Program Idea Note (PIN) :
 - Collect relevant information for the preparation of the Program Idea Note (PIN) and the individual CPAs.
 - Liaise with other consultants (legal, technical, environmental, etc.) recruited by the Greater Amman Municipality for the preparation of this Municipal Services PoA and take into account, whenever relevant, the findings of their respective due diligence.
 - Determine a likely scenario for the portfolio of projects (CPAs) that will be included in this City wide PoAs and estimate the total amount of Emission Reductions (ERs) generated from each CPA.
 - Provide a preliminary analysis of baseline and additionality.
 - Based on the information collected from GAM, consistent with the agreed scenario for the portfolio of projects, prepare a financial analysis required for the PoA and the CPAs using the format prescribed by the World Bank.

- Prepare a brief summary of the major environmental and socio-economic benefits (local and global) expected from the PoA and CPAs.
- Complete the PIN sections as needed.

2- SELECTION CRITERIA

The initial selection criteria of the CPAs were based on the list proposed in the terms of reference, namely:

1. Readiness of GAM to implement the selected activity;
2. Financing availability;
3. Approved CDM methodology ;
4. Emissions reduction potential;
5. Expected implementation date.

Meetings with GAM management confirmed that all CDM opportunities of Amman's urban development plan as well as all activities under GAM's mandate should be explored. Given the fact that the CDM projects are to be developed under the city wide programmatic approach that allows for various methodologies to be used, it was decided to include all Amman City wide eligible activities.

3- CDM CAPACITY BUILDING WORKSHOP

The objective of the workshop was to raise the awareness of all concerned GAM's Staff on the benefits of CDM and help identify projects ideas to be considered for Amman's City Wide CDM program.

Overall, about ten GAM's staff members have participated in the workshop.

The workshop agenda is presented in the following page and the presentations are provided in annex D.

Workshop minutes:

A welcome opening speech was made by Mr. Bashar Haddaden, Director Special Projects & Investments Department at GAM who summarized GAM's development plans and stressed the need for GAM to develop the CDM activities as a tool for the sustainable development of the City.

A presentation on the CDM concept was made as introduction to the workshop. It outlined the modalities and requirements of the UNFCCC, Kyoto Protocol (KP), Marrakech accords and the CDM. An overview of carbon finance and CDM market was offered during the first session of the workshop.

The CDM national context was covered in the second presentation made by Eng. Hussein Badarin, Director of Monitoring and Assessment, CDM EB member and DNA representative, Ministry of Environment. The presentation outlined the CDM activities in Jordan, the DNA role and procedures for CDM projects' evaluation by the DNA.

The following presentation focused on the Gabawi landfill for which GAM is currently developing a biogas to energy CDM project.

In the last presentation, CDM methodologies, baselines and additionally were illustrated with many examples from various sectors: renewable energy, energy efficiency, efficient lighting, cogeneration, fuel switching, transport systems, etc.

An open question and discussion session was held after the presentations. Answers to questions on the requirements, CDM procedures and eligibility were provided by the consultant and the DNA representative. The discussion session focussed mainly on the CDM opportunities for GAM and the best approach to develop the identified CDM potential projects.



**MNA Region - Carbon Finance Assist Program
Support to the development of a city wide CDM program for
Greater Amman Municipality**

CDM Workshop

Tuesday April 21, 2009

PROGRAMME

9:00-9:15	Registration	
9:15-9:25	Welcome opening remarks; Objective and Agenda of the Workshop GAM/Ministry of Environment/DNA	
9:25-9:45	1- Kyoto Protocol, Project Cycle Carbon market	Dr. Lahbabi World Bank Consultant
9:45- 10:00	2- CDM in Jordan – Role of the DNA	Eng. Hussein Badarin, DNA
10:00-10h15	3 Amman Ghabawi landfill CDM project	Eng. Ahmad G. Alhyasat /GAM
10:15-10:45	Coffee Break	
10:45-11h15	4 CDM in Practice – Examples (Renewable Energy, Energy efficiency, Transport, Solid waste, etc.)	Dr. Lahbabi
11:15 -12:00	5 Questions – Clarifications Discussion and recommendations	GAM/DNA/WB

4- CDM OPPORTUNITIES FOR GAM

4-1 Introduction

The analysis of the GAM activities and urban development plans confirmed that the potential eligible CDM activities concern six main sectors:

- ✚ Solid waste;
- ✚ Renewable energy;
- ✚ Energy efficiency;
- ✚ Fuel switching;
- ✚ Waste water treatment;
- ✚ Transport.

The CDM opportunities of these sectors were explored for potential CPAs during the field visits. Meetings were held with the main stakeholders concerned with the projects implementation and CDM development.

4-2 Sectoral analysis

Solid waste: Solid waste management in the GAA is under the GAM responsibility. It is also considered as one of the most promising sector for municipalities for CDM development. GAM has already developed two CDM projects in the sector:

- ✚ Russeifeh landfill: the PDD has been validated and deposited for registration. The Jordan Biogas Company has signed an Emission Reduction Purchase Agreement (ERPA) with the Finn Government to develop the CDM Project.
- ✚ Al Ghabawi landfill: the PDD is under validation. GAM has signed an ERPA with the WB for the development of the CDM project and for CERs handling. The biogas production and use for electricity generation will be subcontract to a private operator who will also have the responsibility of the ERs monitoring.

The CDM projects of the Municipal Solid Waste sector are under validation for registration as independent projects and thus won't be considered for the city wide CDM program.

Renewable Energy: Renewable energy is one of the most productive sectors for carbon credits. The sector accounts for around 70% of the CDM registered projects¹. It comprises solar, wind, hydro as well as biogas, biomass and geothermal projects.

The Government of Jordan GoJ has adopted a Renewable Energy strategy that sets a target of 7% of the country's energy mix to come from renewable sources by 2015 and up to 10% by 2020. Most of the RE contribution is expected to come from wind farms.

¹ As of April 18, 2009

A draft of an Energy and Mining law has been prepared and is currently in the process of validation and approval. The new law proposal provides for extensive financial incentives for the development of RE in Jordan: income tax holiday, duty free equipment imports, waiver of stamp duties, free use of public lands, and free cost of interconnecting to the electricity grid.

The law also provides for the establishment of a Renewable Energy and Energy Efficiency Fund REEF for RE projects development through a performance based subsidies/grants

Two promising CPAs have been identified in the Renewable Energy sector:

- ✚ Wind energy generation for GAM use ;
- ✚ Solar water heaters program for Amman's households.

Wind farm:

The proposed project consists of the investment in a wind farm that will displace the current electricity used by GAM mainly for streets lighting.

The project aims at the supply of the GAM from a clean and Renewable Energy (RE) source namely wind and thereby help reduce the level of carbon emissions associated with the use of the fossil fuels based grid electricity.

This project is to be developed in close cooperation with NERC according to the recent MoU signed by GAM and NERC.

The details of the CDM CPA developpement (context, eligibility, methodology, ER evaluation, environmental and social benefits, etc.) are presented in the CDP program PIN (see paragraph N°5).

The project is at the concept idea stage. The preliminary ER evaluation is based on the following assumptions:

Parameter	Unit	Value
GAM electricity bill	M JD/year	6,5
Length of slighted streets	km	633
Electricity unit price	JD/kWh	0,051
GAM electricity consumption	GWh/year	126,51
Installed capacity estimation	MW	41,12
Grid emission factor	t CO2/MWh	0,6128
Expected annual emissions reduction	t CO2/year	77 500

Note that currently, not all street lighting in Amman is the responsibility of GAM. It is divided between GAM, the Ministry of Public Works and Housing and JEPCO. According to the director of the lighting section in GAM, an agreement will be signed between GAM and the Ministry of Public Works and Housing to transfer the responsibility of some streets lighting to GAM (270 km worth) and as a result the current GAM's electricity bill will increase substantially.

The project is based on the future GAM's electricity needs after the transfer of the 270 km long streets. The proposed installed capacity is 40 MW and the resulting ERs are estimated at 77 500 t CO₂/year.

Solar Water heaters program:

Jordan enjoys a high potential of solar energy (5.6 kWh/m²/day) and solar applications are very common: water heating, space heating, crop and vegetable drying.

It is estimated that about 15% of households in Jordan use SWH as the main energy source for water heating.

According to the National Energy Renewable Centre (NERC), there are over 30 local manufacturers of solar collectors in Jordan, most of them located in Amman. However, only two of these manufacturers produce collectors in accordance with the RSS design criteria. The annual production rate is around 4,000 units. Solar collectors are also imported mainly from Turkey and Europe.

Despite the existence of a local SWH industry and the current fair penetration rate, the potential of solar energy is still underexploited. This could be explained by the various regulatory, technical, financial and commercial barriers the large scale deployment of SWH is facing. The proposed CPA aims at the wide spread use of SWH for households in the Greater Amman Area (GAA).

The CPA implementation will help achieve the Energy Strategy target to improve the current penetration rate of SWH in Jordan from 15% to 25% by 2015.

A total of 42 000 household SWH should be installed in five years period representing 107 000 m² of solar panels. The total installed capacity is estimated at 70 MW peak. With the CPA implemented it is expected that the penetration rate will reach 25% in the GAA by the end of the program achieving thereby the objective of the Jordan Energy Strategy for the solar water heating systems.

A diagnosis of the current SWH market should be carried out for the CPA concept design to better assess the demand and help identify the barriers to the widespread of SWH in Jordan. The CPA concept will integrate the solutions to the identified barriers as well as lessons learned from SWH programs' implementation in others countries. More importantly, it should define the appropriate financial scheme for the large deployment of SWH in Jordan.

This project is at the concept idea stage. It is to be developed in close cooperation with NERC according to the recent MoU signed by GAM and NERC.

The details of the CDM CPA developpement (context, eligibility, methodology, ER evaluation, environmental and social benefits, etc.) are presented in CDM program's PIN (see paragraph N°5).

The preliminary ER evaluation is based on the following assumptions:

Parameter	Unit	Value
Installation rate	Units/year	8 500
Program implementation period	years	5,0
Solar Unit used		
Person per household		5,0
Water requirement	l/day	250,0
Water temperature	°C	60,0
Panel surface	m2	2,5
Capacity	kW	1,6
Cost	\$/m2	400,0
Increase rate without CPA	Units/year	1 700
Energy currently used for water heating		
Solar	%	15%
Electricity	%	20%
Gas or kerosene/diesel	%	65%

Based on the above assumptions, the expected average ERs over the first 10 years are estimated at 25 500 t CO₂/year.

Energy efficiency: Energy Efficiency comprises all the technologies, processes and measures that reduce the energy consumption required to produce one unit of goods or to deliver a specified service. Thus, for the same production or service offered, less energy is used and the associated GHG emissions are then reduced.

GAM's current energy needs are mainly for lighting. Accordingly, two CPAs are proposed for efficient lighting to be developed within the Amman's city wide CDM program.

Electricity use of lighting is estimated in Jordan at 1 800 GWh/year representing more than 18% of the total electricity consumption. Moreover, lighting contributes significantly to the power peak load resulting in additional investment requirements in the generation capacity to meet the electricity demand. It should be noted that the use of efficient lighting has a potential of 40% to 70% electricity savings.

In fact most of the large scale efficient lighting projects are driven by the objective of addressing peak power shortages, load shedding, etc. The proposed program has a three fold benefit a) energy savings and reduced monthly electricity bills for the consumers ii) power peak demand reduction iii) reduction of the GHG emissions associated with the electricity generation.

Various energy efficient lighting options exist: Compact Fluorescent Lamps (CFL) – High Pressure Sodium lamps (HPS), Fluorescent tube lights, Electronic Ballasts, Light Emitting Diodes (LEDs), etc.

Two CPAs has been identified for the efficient lighting: replacement of energy inefficient Incandescent Lamps (IL) by CFLs (15 W and 20 W) in households and efficient street lighting using High Pressure Sodium (HPS) lamps (70 W) in replacement of Mercury Vapor Lamps (125 W, MVL).

Efficient lighting for households: The proposed CPA consists of a large scale use of CFLs for households' and buildings lighting in the GAA. It will help replace the current widely used non efficient Incandescent Lamps (IL) by CFLs. It will contribute to substantial electricity savings and thus will help reduce the emissions of Green House Gases (GHG) associated with fossil fuels electricity generation.

The proposed CPA aims at the replacement of 1,74 million IL with CFLs. The project is expected to reach a household penetration rate of 40% (8% a year) after five years operational period.

The main parameters used for the CPA's ERs evaluation are summarized in the following table:

Parameter	Units	Value
Average number of 60 W Lamps	Lamps/household	6
Average number of 100 W Lamps	Lamps/household	4
Average daily hours use	Hours	3
Total number of households in GAA		434 806
CFL yearly Penetration rate	% households/year	8%
Targeted penetration rate	% households	40%
Adjustment savings factor		
For CFL component	%	25%
Emission factor	t CO2/MWh	0,6128

After the fifth year, the ERs should be maintained at the 51 600 tCO₂ level provided that the lamps are replaced at the expiration of their life time or failure

Besides the energy savings and GHG emissions reduction the CFL program will help offset around 38 MW of peak demand.

As an energy efficiency project, the proposed CPA is eligible for CDM and could benefit from the REEF's financial subsidies/grants.

The details of the CDM CPA developpement (context, eligibility, methodology, ER evaluation, environmental and social benefits, etc.) are presented in the CDM program PIN (see paragraph N°5).

Efficient street lighting: The proposed CPA aims at the systematic use of efficient lighting lamps in the secondary streets of the Greater Amman Area (GAA).

The proposed CPA will help replace the non efficient Mercury Vapor Lamps (MVL) widely used for secondary street lighting with High Pressure Sodium lamps (HPS). It will contribute to substantial electricity savings and thus will help reduce the emissions of Green House Gases (GHG) associated with fossil fuels electricity generation.

The proposed CPA aims at the replacement of 100 000 Mercury lamps with HPS. The expected CERs have been evaluated at 11 500 tCO₂/year. The details of the CDM CPA developpement (context, eligibility, methodology, ER evaluation, environmental and social benefits, etc.) are presented in the CDM program PIN (see paragraph N°5).

Fuel switching: Switching from intensive fossil fuels (coal, heavy fuel oil, gas oil, etc.) to less intensive fossil fuels (Natural gas, LPG) results in GHG emission reductions achieved as a result of the decreased carbon intensity of electricity and/or heat generation. Hence the use of natural gas for power generation, in the industry, households or in cars is eligible for CDM.

Natural gas is supplied to Jordan through ArabGas pipeline (Egypt-Jordan, Syria, Lebanon then Cyprus and Europe) operational since 2003. Most of the thermal power stations have been converted to natural gas: 80% of electricity generation in Jordan is based on natural gas.

Purchase agreement between Egypt and Jordan has been signed for the Natural Gas (NG) supply for the period 2003-2018. Negotiations are underway for supply increase to extend the NG use to households, commercial and industrial establishments and for the use in Natural Gas Vehicles (NGV).

The Ministry of Energy and Mineral Resources is planning to connect Amman to the NG pipeline network and use NG for 240 000 households over the period 2010-2020. The first phase of the project is under negotiation. The total project's investment cost is estimated at 1 billion \$. The first connections are expected by 2012. According to the project's implementation schedule, 500 M m³/year should be supplied by 2016 for 74 000 households, 1000 commercial outlets and 8 CNG stations for NGV.

The project's implementation should be done according to a DBOT scheme managed by the MEMR. Despite its obvious benefits for the GAA residents and for GAM, the NG project is highly technical and GAM direct contribution to the project activities should be limited. Accordingly, the proposed CDM developpement for GAM was limited to the NGV component of the NG project. The corresponding CPA is developed under the transport sector (see transport paragraph below).

Waste water treatment: the company Miyahona is in charge of water supply and waste water treatment in Amman area. The company is managing two waste water treatment plants: Abou Noussair (250 000 m³/day); Wadi Sir 4 000 m³/day and a dumping/transfer site in Ghazal close to the slaughter house.

GAM has decided to establish a new slaughterhouse servicing the greater Amman area including Al-Russayfeh and Al-Zarqa. The project aims at the development of a new modern slaughterhouse facility in accordance with national and international technical and hygiene standards.

The project is to be implemented in partnership with a private operator on a DBOT basis. The qualified investor will take in charge the design, building and operating of the new facility for 25 years. The project site has been selected and the land plot, located 5 km south of Amman near the power station, will be granted by GAM. The project’s feasibility study has been done and the EIA of the project is underway.

The new facility will provide for slaughtering services, slaughtering inspection services, meat inspection, sales of by-products (hearts, livers, skins etc.) storage services, freezing store services, biogas capture and electricity generation as well as waste water treatment and water reuse for irrigation.

The new slaughterhouse facility will be designed to handle, at full capacity, 41 600 cattle/camels, 624 000 sheep/goats and 12 480 000 birds per annum.

The new slaughterhouse facility is to be equipped with a biological waste water treatment plant. Biogas generated from the anaerobic treatment of the charged wastewater will be captured and use for electricity generation. The electricity produced will be used directly in the slaughterhouse providing for around 60% of the facility electricity needs. According to the project’s Feasibility Study (FS) [9], at full capacity, an estimated 6 263 MWh a year will be generated from the captured biogas.

A proposed CPA related to the WWTP of the new slaughter house project has been considered for Amman’s wide city CDM program. It consists of the capture of the biogas generated by the organic waste anaerobic treatment and its use for electricity generation. Based on the electricity generation of the project’s FS, the CPA expected ERs have been estimated at 4 400 tCO₂/year. The details of the CDM CPA developpement (context, eligibility, methodology, ER evaluation, environmental and social benefits, etc.) are presented in CDM program PIN (see paragraph N°5).

Transport: Amman is a growing city with an estimated population of 2.3 millions. The rapid population growth is expected to continue with GAA population reaching 6.4 millions by 2025.

The cars park in Jordan is growing at an estimated average of 10%. Most Amman inhabitants use their cars for transportation. The following table presents the transport repartition mode in Amman city:

Transport mode	%
Private car	53%
Bus or minibus	18%
Walking	10%
Other modes	19%

Source: GAM, transport Department, 2007

According to GAM, public transport in Amman is underdeveloped, unreliable and lacks a well structured hierarchy of transportations modes and services.

The proposed CPA consists of the implementation of a comprehensive transport optimization action plan for the GAA calling for the increase of the public transport mode from the current 18% to 40% by 2025. Besides comprehensive transport policies, the action plan envisions the deployment of a Bus Rapid Transit system (BRT), a Rail Road Transit system (RRT) and the use of Compressed Natural Gas (CNG) for vehicles. Fuel switch to CNG is planned for GAM fleet comprising 25 000 Vehicles and Taxis.

The proposed CPA will provide a high quality public transport service and increase the share of passengers using public transport system. The CPA will thus help reduce the fuel intensity for transport. The CPA will also help switch utilities vehicles (buses and taxis) from gasoline and diesel to a more environmentally friendly fuel namely natural gas. The use of NCV will reduce the emission of GHG mostly CO₂.

GAM's project is at the conception phase. The CPA was developed under the following assumptions:

Parameter	Unit	Value
BRT/RRT		
Number of vehicles a day		350 000
Increase rate	%	5%
Average number of persons per car		1,3
Average distance	km/day	40
Average fuel consumption	l/km	0,1
Fuel consumption	liters/day	1 400 000
People taking public transportation	%	18%
Increase rate	%	5%
Target public transportation by 2025	%	40%
Natural Gas Vehicles		
Number of concerned vehicles		25 000
Average fuel consumption	l/km	0,12
Average distance	km/j	120
ER estimated rate	%	15%

The CERs estimation based on the objective of reaching a 40% of Amman passengers using public transport in 2025 and the conversation of 25 000 utility vehicles to natural gas is presented below:

Year	ER tCO2		
	BRT/RRT	NGV	Total
2012	43 300	10 000	53 300
2013	90 900	20 100	111 000
2014	143 200	30 100	173 300
2015	225 500	40 200	265 700
2016	296 000	50 200	346 200
2017	373 000	50 200	423 200
2018	457 000	50 200	507 200
2020	548 400	50 200	598 600
2021	679 800	50 200	730 000
2022	755 700	50 200	805 900
TOTAL	3 612 800	401 600	4 014 400

The expected CERs annual average over the first ten years is around 401 400 t CO₂/year.

The above CERs estimation is based on the preliminary assumptions made that should be refined once the project feasibility study has been done and the precise CPA concept has been fully determined.

5- PROGRAM IDEA NOTE

The PIN developed for GAM using the WB template for City Wide CDM program is presented below. It comprises the six identified CPAs as detailed in the previous paragraph. It should be noted that most of the identified CPAs are the concept idea stage. The assumptions made should be validated and the ERs calculations refined once the CPAs feasibility studies done and the projects concepts fully determined.

The PIN of Amman's city wide CDM program is provided below:

City-wide PROGRAM NOTE

Name of City: Greater Amman

SECTOR Scopes: Renewable energy, Energy Efficiency and Waste

Date submitted: October 05, 2009.

Description of size and quality expected of a Program Note

Basically a PN will consist of approximately 10-12 pages providing indicative information on:

- the type of program – policy, sector and technology
- location
- the suggested crediting life time
- No. and types of project activities expected to participate
- The Methodology to be used, if existing
- the financial structuring (indicating which parties are expected to provide the program and individual project financing)
- the project's other socio-economic or environmental effects/benefits

While every effort should be made to provide as complete and extensive information as possible, it is recognised that full information on every item listed in the template will not be available at all times for the entire program (POA) and is not expected for each project (CPA).

A. PROGRAM DESCRIPTION, TYPE, LOCATION AND SCHEDULE

<p>OBJECTIVE OF THE PROGRAM <i>Describe in not more than 2 lines</i> <i>(Policy, Technology, other goal)</i></p>	<p>The objective of the program is to promote city wide sustainable development projects within the framework of the ambitious Greater Amman Master Development plan 2025</p>																								
<p>DESCRIPTION OF PROGRAM <i>About ½ page</i></p>	<p>The program aims at the CDM development of all GAM's SD projects and the offset or reduction of GHG emissions associated with the envisioned spectacular urban development of the city. The proposed program's CPAs will tackle the use of renewable energy based electricity, the efficient lighting of households and city streets, the extensive use of solar water heaters, methane capture and use for electricity generation in the new state of the art planned slaughterhouse and finally transport. Three potential CPAs have been considered for the transport sector:</p> <ul style="list-style-type: none">  Bus Rapid Transit system  Rail Road Transit System  Use of Compressed Natural Gas for vehicles 																								
<p>PROGRAM FINANCE <i>(Description of financial mechanism to be used by the program – loan/subsidy/grant, if any. Also describe the impact of program finance on CPA implementation, if any.)</i></p>	<p>The investment costs of the different program's considered CPAs are provided below:</p> <table border="1" data-bbox="608 969 1476 1783"> <thead> <tr> <th>CPA N°</th> <th>Title</th> <th>Investment M\$</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Investment in a wind farm that will displace the current electricity used in Amman mainly for streets lighting.</td> <td>72</td> </tr> <tr> <td>2</td> <td>Replacement of Incandescent Lamps by CFL programs</td> <td>5,7</td> </tr> <tr> <td>3</td> <td>Systematic use of efficient lighting lamps in the secondary streets of the Greater Amman Area (GAA).</td> <td>9</td> </tr> <tr> <td>4</td> <td>Wide spread use of SWH for households in the Greater Amman Area (GAA).</td> <td>43</td> </tr> <tr> <td>5</td> <td>New slaughter house project: capture of the biogas associated with the waste water treatment plant and electricity generation</td> <td>45,3</td> </tr> <tr> <td>6</td> <td>Optimal transport system: Bus Rapid Transit system, Rail Road Transit System use of Compressed Natural Gas for vehicles</td> <td>2 650</td> </tr> <tr> <td colspan="2" style="text-align: center;">Total</td> <td>2 825</td> </tr> </tbody> </table> <p>The financing schemes of the program's CPAs are to be determined at subsequent projects' development stage. They could include, equity, loan, grants, private sector financing through DBOT schemes, project's beneficiaries contribution etc.</p>	CPA N°	Title	Investment M\$	1	Investment in a wind farm that will displace the current electricity used in Amman mainly for streets lighting.	72	2	Replacement of Incandescent Lamps by CFL programs	5,7	3	Systematic use of efficient lighting lamps in the secondary streets of the Greater Amman Area (GAA).	9	4	Wide spread use of SWH for households in the Greater Amman Area (GAA).	43	5	New slaughter house project: capture of the biogas associated with the waste water treatment plant and electricity generation	45,3	6	Optimal transport system: Bus Rapid Transit system, Rail Road Transit System use of Compressed Natural Gas for vehicles	2 650	Total		2 825
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<p>3COORDINATING ENTITY (Public/Private, state legal and financial status and program implementation, monitoring and management capacity)</p>	<p>The program's coordinating entity is Greater Amman Municipality GAM. A public entity in charge of the city wide services management.</p> <p>The Municipality of Greater Amman is Governed by a special legislation and regulations; its City Council is composed of 68 members, working within 14 committees, and headed by the Mayor of Amman. It serves around 40% of Jordan population (2.3 millions) and its mandate extends on some 1700 km².</p> <p>GAM has developed recently an ambitious Master Development plan based on an innovative approach to metropolitan, urban and community planning. The Amman Plan is being developed in seven planning phases covering a metropolitan growth plan, a transportation and transit plan, an integrated servicing infrastructure plan etc. Over all the Amman development plan implementation calls for an estimated investment of millions JD by 2025.</p>
<p>DESCRIPTION OF TECHNOLOGY or MEASURES TO BE EMPLOYED</p>	<p><i>Include all eligible sectors and activities</i></p> <p>CPA 1: 40 MW Wind farm- Wind farm are widely used. Important progress has been made in the design of the turbines. 5 MW unit turbine capacity is currently common.</p> <p>CPA 2 and CP 3: Efficient lighting for households and streets. Various energy efficient lighting options exist: Compact Fluorescent Lamps (CFL) – High Pressure Sodium lamps (HPS), Fluorescent tube lights, Electronic Ballasts, Light Emitting Diodes (LEDs), etc. CPA 2 is to be implemented for the replacement of energy inefficient Incandescent lamps by CFLs (15 W and 20 W). For street lighting, CPA 3 aims at the replacement of all the Mercury Vapor Lamps (125 W, MVL) by more energy efficient lamps namely HPS lamps (70 W).</p> <p>CPA 4: Wide use of Solar Water Heaters (SWH). Solar water heating technology is simple and widely used. It consists mainly of solar panels that convert solar radiation into thermal energy for the heating of domestic water, water storage tank, circulating pump, water piping, pressure and temperature control measurement equipment etc. Currently, there are over 30 local manufacturers of solar collectors in Jordan, most of them located in Amman.</p> <p>CPA 5: Biogas capture from slaughter house waste water and use for electricity generation. Biogas based electricity generation motors are reliable and widely used.</p> <p>CPA 6: Optimal transport system for Greater Amman Area (GAA). The proposed CPA is part of GAM's transport action plan that aims at the establishment of an integrated transport network that provides high quality, safe and reliable transport services to the residents of GAA. It comprises, among other activities, a Rapid Bus Transit (BRT) and rail-based corridors.</p>
<p>TYPE OF PROGRAM</p>	
<p>Sectoral Scope (mention what is applicable)</p>	<p>Renewable energy; Energy efficiency; Fuel switch; Waste; Transport</p>
<p>Greenhouse gases targeted CO₂/CH₄/N₂O/HFCs/PFCs/SF₆ (mention what is applicable)</p>	<p>Mainly CO₂ and CH₄</p>
<p>Abatement/CO₂ sequestration (mention what is applicable)</p>	<p>CO₂ Abatement</p>

LENGTH OF PROGRAM (Up to 28 years)	28 years
LOCATION OF THE PROGRAM	
Country / Region (one or more)	The program activity covers the Greater Amman Area
RELATIONSHIP BETWEEN PROGRAM & PROJECT (if any existing between coordinating entity and CPA owner; if not, what is expected in the future)	<p>RELATIONSHIP BETWEEN THE CITY MANAGERS AND THE DEPARTMENT (E.G., WATER SUPPLY) OR CONTRACTOR (E.G., TRANSPORT OPERATOR)</p> <p>The considered CPAs are part of the mandate of the Greater Amman Municipality. However, given the required management technical expertise, GAM will subcontract some activities to private sector operators and will establish CPAs specific partnerships with public entities such as the Royal Scientific Society (RSS), National Energy Research Centre (NERC), Ministry of Energy and Mining resources, The Jordanian Electric Power Co. ltd. JEPSCO; The Ministry of Transport, Ministry of Environment.</p> <p>A MoU has been already signed between GAM and NERC for the collaboration on the implementation of the renewable energy CPAs, namely Wind farm and SWH.</p> <p>Given the importance of the transport projects, the sector considered CPAs will probably be implemented by private transport operators financing under long terms contracts with GAM.</p>
ELIGIBILITY CRITERIA (Which projects will be allowed to join the program and how will they be identified?)	<p>DETAIL CRITERIA –</p> <ul style="list-style-type: none"> - GHG IMPACT - FINANCIAL CONSTRAINTS - TECHNICAL CHALLENGES - AND SO ON <p>The following criteria have been retained for the eligibility of a CPA in the proposed City wide CDM program:</p> <ul style="list-style-type: none"> ✚ CPA activity is located in the GAA; ✚ The CPA activity is related of one of the five sectors targeted by the program: renewable energy, energy efficiency, fuel switch, waste and transport; ✚ CDM eligibility and additionality of the considered CPA; ✚ Availability of an Environmental Evaluation of the CPA in conformity with the Jordan laws and World Bank Safeguards policies.
EXPECTED PROGRAM SCHEDULE	
PROGRAM START DATE Year in which the Program will become operational	The planned starting year of the program is 2012
PROGRAM IMPLEMENTATION SCHEDULE	<p>A two years period is required for the CPAs preparation and the program registration</p> <p>Preparation period: 2010-2011 CPAs implementation period: 2012-2016.</p> <p>The transport CPA will be carried out in two phases: Phase 1: 2010-2015 : BRT 30 km three routes ; 20 km rail and Intermodal and gateway terminals Phase 2: 2015-2025: BRT 20 km three routes; 20 km rail, gateway terminals and Park and Ride facilities.</p>
Estimate of time required before becoming operational after approval of the PIN	Two years

Expected first year of CER/ERU/VERs delivery	2011
Current status or phase of the PROGRAM DESIGN (<i>Pre-selection phase/opportunity study finished/pre-feasibility study finished/feasibility study finished/negotiations phase/contracting phase etc.- mention what is applicable and indicate the documentation</i>)	Most of the CPAs considered are at the pre-selection/opportunity study phase
Current status of acceptance of the Host Country (or countries) <i>Letter of No Objection/Endorsement is available; Letter of No Objection/Endorsement is under discussion or available; Letter of Approval is under discussion or available (mention what is applicable)</i>	<p>The CPA ideas were discussed with the technical service of GAM. The PIN is to be submitted to GAM for approval.</p> <p>An information letter on the program and the considered CPAs has been sent by GAM to the DNA.</p>
The position of the Host Country (or countries) with regard to the Kyoto Protocol	<p>Has the Host Country ratified/acceded to the Kyoto Protocol?</p> <p>Jordan has ratified the Kyoto Protocol on January 17, 2003</p> <p>Has the Host Country established a CDM Designated National Authority / JI Designated Focal Point?</p> <p>Jordan has an established DNA</p>

B. METHODOLOGY AND ADDITIONALITY

<p>Methodology Please choose from the following options:</p> <p>For CDM PROGRAMS: (i) Covered by an existing Approved CDM Methodology or Approved CDM Small-Scale Methodology (ii) Needs a new methodology (iii) Needs modification of existing Approved CDM Methodology</p>	<p>LIST ALL THE METHODOLOGIES THAT WILL BE USED</p> <ul style="list-style-type: none"> - WASTE - TRANSPORT - ENERGY USE - OTHER NOT COVERED BY CURRENT CDM METHODOLOGIES <p>Energy use: ACM0002: Consolidated baseline methodology for grid-connected electricity generation from renewable sources AMS-IIJ: demand side activities for efficient lighting AMS I.C : thermal energy for the user AMS I.D. : Grid connected renewable electricity generation</p> <p>Waste ACM0001 : Consolidated baseline and monitoring methodology for landfill gas project activities AMS III.H. Methane Recovery in Wastewater Treatment</p> <p>Transport: AM 0031: Baseline Methodology for Bus Rapid Transit Projects AMS III.C: Emission reductions by low-greenhouse gas emitting vehicles New methodology under validation: NM0258 (variation of AM0031 and NM0266 for Railway Rapid Transit Projects)</p>																																																
<p>ESTIMATE OF GREENHOUSE GASES ABATED/ CO₂ SEQUESTERED BY ONE TYPICAL CPA <i>In metric tons of CO₂-equivalent, please attach calculations</i></p>	<p>Annual (if varies annually, provide schedule): Up to and including 2012: Up to a period of 10 years:</p> <table border="1" data-bbox="608 1220 1554 1675"> <thead> <tr> <th>CPA N°</th> <th>Title</th> <th>Investment M\$</th> <th>Expected first crediting year</th> <th>Expected ERs first 10 years period tCO2</th> <th>Yearly Average CERs</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Investment in a wind farm that will displace the current electricity used in GAM mainly for streets lighting.</td> <td>72</td> <td>2012</td> <td>775 260</td> <td>77 526</td> </tr> <tr> <td>2</td> <td>Programme for the replacement of Incandescent Lamps by CFL</td> <td>5,7</td> <td>2012</td> <td>413 129</td> <td>41 313</td> </tr> <tr> <td>3</td> <td>systematic use of efficient lighting lamps in the secondary streets of the Greater Amman Area (GAA).</td> <td>9,15</td> <td>2011</td> <td>115 000</td> <td>11 500</td> </tr> <tr> <td>4</td> <td>wide spread use of SWH for households in the Greater Amman Area (GAA).</td> <td>43</td> <td>2012</td> <td>255 000</td> <td>25 500</td> </tr> <tr> <td>5</td> <td>New slaughter house project: capture of the biogas associated with the waste water treatment plant and electricity generation</td> <td>45,4</td> <td>2012</td> <td>31 480</td> <td>3 148</td> </tr> <tr> <td>6</td> <td>Optimal transport system: Bus Rapid Transit system, Rail Road Transit System Use of Compressed Natural Gas for vehicles</td> <td>2 650</td> <td>2012</td> <td>4 014 400</td> <td>401 440</td> </tr> <tr> <td colspan="2" style="text-align: center;">Total</td> <td>2 825</td> <td>2011</td> <td>5 604 269</td> <td>560 427</td> </tr> </tbody> </table>	CPA N°	Title	Investment M\$	Expected first crediting year	Expected ERs first 10 years period tCO2	Yearly Average CERs	1	Investment in a wind farm that will displace the current electricity used in GAM mainly for streets lighting.	72	2012	775 260	77 526	2	Programme for the replacement of Incandescent Lamps by CFL	5,7	2012	413 129	41 313	3	systematic use of efficient lighting lamps in the secondary streets of the Greater Amman Area (GAA).	9,15	2011	115 000	11 500	4	wide spread use of SWH for households in the Greater Amman Area (GAA).	43	2012	255 000	25 500	5	New slaughter house project: capture of the biogas associated with the waste water treatment plant and electricity generation	45,4	2012	31 480	3 148	6	Optimal transport system: Bus Rapid Transit system, Rail Road Transit System Use of Compressed Natural Gas for vehicles	2 650	2012	4 014 400	401 440	Total		2 825	2011	5 604 269	560 427
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<p>ADDITIONALITY Please explain which additionality arguments apply to the program (This should be reflected directly in program design):</p> <p>(i). Would these emission reductions occur without this</p>	<p>The program additionality is established by the justification of the individual CPAs additionality.</p> <p>For the Wind farm, according to the ACM0002, the additionality is to be established by an investment analysis by comparison of the CPA IRR with the GAM IRR benchmark.</p> <p>For the efficient lighting projects the additionality is to be justified by the initial investment barrier. Without the financial schemes to be established by the</p>																																																

<p>CDM program or the policy/technology that it supports? (ii) The policy, regulation or incentive scheme covered by this program was either not existing earlier or not implemented effectively (<i>require proof for latter</i>) (iii) the program provides financing/grant support, without which projects would not be implemented (iv) country risk, new technology for country, other barriers (v) other</p>	<p>program, households won't invest in energy efficient lighting due the required initial investment.</p> <p>For solar water heaters, initial investment barrier, technological barriers and the common practice could all be invoked for the CPA additionality justification.</p> <p>As for the biogas capture from the WWTP of the new slaughter house and use for electricity generation, it can be shown that the electricity revenues won't compensate for the CPA investment cost. In other words, without the additional revenues of carbon, the CPA is not financially attractive.</p> <p>GAM has adopted an action plan for the improvement of the public transport. The carbon revenues will contribute to lower public transport costs and fares. It will thus help attract more passengers to reach the ambitious set target of 40% of the total city passengers using public transportation by 2015.</p> <p>Technological barrier, higher cost, common practice are barriers among others that can be invoked for additionality justification of the use of NGV.</p>
<p>SECTOR BACKGROUND Please describe the laws, regulations, policies and strategies of the Host Country (or multiple countries) that are of central relevance to the proposed program, as well as any other major trends in the relevant sector.</p>	<p>PROVIDE INFORMATION ON THE CITY:</p> <p>Amman, the capital of Jordan, is one of the oldest continually inhabited cities in the world but essentially it has been developed under its current modern shape during the 20th century. Few isolated remains of previous settlements can be found amongst the modern buildings. Traces have been found of Stone Age homes dating to 7000 BC.</p> <p>Like Rome, Amman is built on seven hills, known as <i>jabals</i>, which define the city. Each of these neighborhoods once had a traffic circle and directions are given in relation to them. First Circle is near downtown and from there the city spreads westward to Eighth Circle. The greater Amman area extends on some 1700 km².</p> <p>The current population of the city of Amman is 2.3 millions corresponding to 38.7% of Jordan total population. The capital population is expected to reach 6.4 millions by 2025, growing at an annual average rate of 6%.</p> <p>The City is managed by the Greater Amman Municipality and Governed by City Council composed of 68 members, working within 14 committees, and headed by the Mayor of Amman.</p> <p>GAM has developed recently an ambitious Master Development plan based on an innovative approach to metropolitan, urban and community planning. The Amman Plan is being developed in seven planning phases covering a metropolitan growth plan, a transportation and transit plan, an integrated servicing infrastructure plan etc.</p> <p>http://www.ammancity.gov.jo/en/english/default.asp</p>

C. PROGRAM FINANCE

TOTAL PROGRAM COST ESTIMATE	
Development costs	___ 4 US\$ million (Feasibility studies, resource studies, etc.)
Management costs	___ 7 US\$ million (Management of program)
Program Costs	2 825 US\$ million (If any subsidy/loan/incentive for program participants)
Other costs (please specify)	___ 4 US\$ million (Legal, consulting, etc.)
Total project costs	2 840 US\$ million

SOURCES OF FINANCE TO BE SOUGHT OR ALREADY IDENTIFIED	
Equity Name of the organizations, status of financing agreements and finance (in US\$ million)	
Debt – Long-term Name of the organizations, status of financing agreements and finance (in US\$ million)	
Debt – Short term Name of the organizations, status of financing agreements and finance (in US\$ million)	
Carbon finance advance payments ² sought from the World Bank carbon funds. (US\$ million and a brief clarification, not more than 5 lines)	
SOURCES OF CARBON FINANCE Name of carbon financiers other than any of the World Bank carbon funds that you are contacting (if any)	
INDICATIVE CER/ERU/VER PRICE PER tCO ₂ e <i>Price is subject to negotiation. Please indicate VER or CER preference if known.</i>	
TOTAL EMISSION REDUCTION PURCHASE AGREEMENT (ERPA) VALUE	
A period until 2012 (end of the first commitment period)	
Period till end of Program	

D. EXPECTED ENVIRONMENTAL AND SOCIAL BENEFITS – PROGRAM LEVEL

LOCAL BENEFITS E.g. impacts on local air, water and other pollution.	The program activity will result in the displacement of fossil-based electricity, elimination of biogas emanations and reduction of individual cars usages. All these activities have positive impacts on the local air quality.
GLOBAL BENEFITS Describe if other global benefits than greenhouse gas emission reductions can be attributed to the project.	<p>Besides reducing GHG emissions, global benefits of the program at a national level can be summarized as follows:</p> <ul style="list-style-type: none"> ✓ Develop sustainable management practices for GAM; ✓ Improve the global environment in Jordan ; <p>It is expected that the program will be a show case of cities sustainable urban development in the region.</p>

² Advance payment subject to appropriate guarantees may be considered.

SOCIO-ECONOMIC ASPECTS	
<p>What social and economic effects can be attributed to the PROGRAM or a typical PROJECT under the PROGRAM which would not have occurred in a comparable situation without that project? Indicate the communities and the number of people that will benefit from this project. <i>About ¼ page</i></p>	<ul style="list-style-type: none"> ✚ 200 000 people will profit directly from solar water heating; ✚ inhabitants of Amman will benefit from efficient lighting provided by carbon free electricity ✚ Inhabitants of Amman will also benefit from a modern and reliable transport system. They will save time transiting in the Greater City of Amman. Expected positive impacts on economic activities
<p>What are the possible direct effects (e.g. employment creation, provision of capital required, foreign exchange effects)? <i>About ¼ page</i></p>	<p>On the social level, the project will help provide for both short- and long-term employment opportunities in Amman: local contractors and workers will be required for construction and operation of the transport system and for the SWH manufacturing.</p> <p>The program will reinforce the solar panel industry and help set quality standards for the local SWH.</p>
<p>What are the possible other effects (e.g. training/education associated with the introduction of new processes, technologies and products and/or the effects of a project on other industries)? <i>About ¼ page</i></p>	
<p>ENVIRONMENTAL STRATEGY/ PRIORITIES OF THE HOST COUNTRY A brief description of the PROGRAM and CPA's consistency with the environmental strategy and priorities of the Host Country <i>About ¼ page</i></p>	<p>The Government of Jordan GoJ has adopted a Renewable Energy strategy that sets a target of 7% of the country's energy mix to come from renewable sources by 2015 and up to 10% by 2020. Most of the RE contribution is expected to come from wind farms.</p> <p>A draft of an Energy and Mining law has been prepared and is currently in the process of validation and approval. The new law proposal provides for extensive financial incentives for the development of RE in Jordan: income tax holiday, duty free equipment imports, waiver of stamp duties, free use of public lands, and free cost of interconnecting to the electricity grid.</p> <p>The law also provides for the establishment of a Renewable Energy and Energy Efficiency Fund REEF for RE projects development through a performance based subsidies/grants.</p> <p>The program activity is consistent with the GoF strategy of RE development and will largely contribute to the fulfillment of its set objectives and targets.</p>

A. DESCRIPTION OF THE **FIRST** PROJECT ACTIVITY – UNDER THE PROGRAM

DETAILS OF FIRST CPA	
b. Name of the organization	GAM
c. Contact person	Eng. Ahmad G. Alhyasat
d. Contact Details	+962 (6) 4765843 alhyasat.a@ammancity.gov.jo alhyasat@yahoo.com
h. Summary of experience <i>Describe in not more than 5 lines</i>	<p>The Municipality of Greater Amman is Governed by a special legislation and regulations; its City Council is composed of 68 members, working within 14 committees, and headed by the Mayor of Amman. It serves around 40% of Jordan population (2.3 millions) and its mandate extends on some 1700 km2.</p> <p>GAM has developed recently an ambitious Master Development plan based on an innovative approach to metropolitan, urban and community planning. The Amman Plan is being developed in seven planning phases covering a metropolitan growth plan, a transportation and transit plan, an integrated servicing infrastructure plan etc. Over all the Amman development plan implementation calls for an estimated investment of _____ millions JD by 2025.</p>
i. Description of financing sources used by CPA (program funds/equity/debt/others)	<p>The installed wind farm capacity has been estimated at 40 MW. The total investment cost is around 72 M\$.</p> <p>The financing scheme is to be determined at subsequent project's development stage.</p>
DESCRIPTION OF PROJECT ACTIVITY (policy, technology, other details)	<p>The proposed CPA consists of the investment in a wind farm that will displace the current electricity used in GAM mainly for streets lighting.</p> <p>The project aims at the supply of the GAM from a clean and renewable energy (RE) source namely wind and thereby help reduce the level of carbon emissions associated with the use of the fossil fuels based grid electricity.</p> <p>The Government of Jordan GoJ has adopted a Renewable Energy strategy that sets a target of 7% of the country's energy mix to come from renewable sources by 2015 and up to 10% by 2020. Most of the RE contribution is expected to come from wind farms.</p> <p>A draft of an Energy and Mining law has been prepared and is currently in the process of validation and approval. The new law proposal provides for extensive financial incentives for the development of RE in Jordan: income tax holiday, duty free equipment imports, waiver of stamp duties, free use of public lands, and free cost of interconnecting to the electricity grid.</p> <p>The law also provides for the establishment of a Renewable Energy and Energy Efficiency Fund REEF for RE projects development through a performance based subsidies/grants.</p>
LOCATION OF THE PROJECT ACTIVITY	<p>The GoJ has identified favorable locations for renewable projects and has designed specific sites for the development of some 600 MW wind based projects.</p> <p>The specific location of the project will be determined at a subsequent development phase of the project. Depending on financial and operating scheme, the project's site could be proposed by private operators bidding for the development of GAM's wind farm.</p>

<p>BASELINE SCENARIO must result in GHG emissions being lower than “business-as-usual” in the Host Country. At the PIN stage questions to be answered are at least:</p> <ul style="list-style-type: none"> • Which emissions are being reduced by the proposed CDM/JI program? • What would the future look like without the proposed CDM/JI program? <p><i>About ½ - 1 page</i></p>	<p>The electricity currently used by GAM is mostly generated in fossil fuels based power plants feeding the Jordanian electricity grid. This electricity is thus associated with Green House Gases GHG emissions.</p> <p>In the absence of the proposed CPA, GAM will continue to ensure its electricity supply from the grid electricity.</p> <p>The proposed CPA will help displace the use fossil fuels based grid electricity and thereby, reduce the corresponding emissions of GHG mostly CO2.</p>																								
<p>PROJECT SCENARIO</p>	<p>The project scenario consists of the construction of a wind farm that will ensure all GAM electricity needs from wind source ensuring a sustainable clean and renewable energy supply.</p>																								
<p>METHODOLOGY TO BE USED</p>	<p>The approved consolidated CDM methodology ACM0002 is perfectly suited to the CDM development of the proposed project activity:</p> <div style="text-align: center;">    </div> <p style="text-align: right;">ACM0002 / Version 10 Sectoral Scope: 01 EB 47</p> <p style="text-align: center;">Approved consolidated baseline and monitoring methodology ACM0002</p> <p style="text-align: center;">“Consolidated baseline methodology for grid-connected electricity generation from renewable sources”</p>																								
<p>STATUS OF PREPARATION</p>	<p>The project is at the concept design stage</p>																								
<p>EXPECTED START DATE OF PROJECT</p>	<p>The project activity will require two to three years preparation and construction time period.</p> <p>Expected project’s start date: 2012</p>																								
<p>EXPECTED VOLUME OF CER/VER/ERU (based on methodology above)</p>	<table border="1" data-bbox="643 1541 1520 1937"> <thead> <tr> <th style="background-color: #90EE90;">Parameter</th> <th style="background-color: #90EE90;">Unit</th> <th style="background-color: #90EE90;">Value</th> </tr> </thead> <tbody> <tr> <td>GAM electricity bill</td> <td>M JD/year</td> <td>6,5</td> </tr> <tr> <td>Length of slighted streets</td> <td>km</td> <td>633</td> </tr> <tr> <td>Electricity unit price</td> <td>JD/kWh</td> <td>0,051</td> </tr> <tr> <td>GAM electricity consumption</td> <td>GWh/year</td> <td>126,51</td> </tr> <tr> <td>Installed capacity estimation</td> <td>MW</td> <td>41,12</td> </tr> <tr> <td>Grid emission factor</td> <td>t CO2/MWh</td> <td>0,6128</td> </tr> <tr> <td style="color: blue;">Expected annual emissions reduction</td> <td style="color: blue;">t CO2/year</td> <td style="color: blue;">77 526,00</td> </tr> </tbody> </table> <p>Note that currently, not all street lighting in Amman is the responsibility of GAM. It is divided between GAM, the Ministry of Public Works and Housing and</p>	Parameter	Unit	Value	GAM electricity bill	M JD/year	6,5	Length of slighted streets	km	633	Electricity unit price	JD/kWh	0,051	GAM electricity consumption	GWh/year	126,51	Installed capacity estimation	MW	41,12	Grid emission factor	t CO2/MWh	0,6128	Expected annual emissions reduction	t CO2/year	77 526,00
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	<p>JEPCO. According to the director of the lighting section in GAM, an agreement will be signed between GAM and the Ministry of Public Works and Housing to transfer the responsibility of some streets to GAM (270 km worth) and as a result GAM's electricity bill will increase substantially.</p> <p>The above provisional value is based on the future GAM's electricity bill for lighting after the transfer of the 270 km long streets</p>
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B. DESCRIPTION OF THE **SECOND** PROJECT ACTIVITY – UNDER THE PROGRAM

<p>DETAILS OF FIRST CPA</p> <p>b. Name of the organization</p> <p>c. Contact person</p> <p>d. Contact Details</p>	<p>Greater Amman Municipality (GAM)</p> <p>Eng. Ahmad G. Alhyasat</p> <p>+962 (6) 4765843</p> <p>alhyasat@.a@ammancity.gov.jo</p> <p>alhyasat@yahoo.com</p>
<p>h. Summary of experience</p> <p><i>Describe in not more than 5 lines</i></p>	<p>The Municipality of Greater Amman is Governed by a special legislation and regulations; its City Council is composed of 68 members, working within 14 committees, and headed by the Mayor of Amman. It serves around 40% of Jordan population (2.3 millions) and its mandate extends on some 1700 km2.</p> <p>GAM has developed recently an ambitious Master Development plan based on an innovative approach to metropolitan, urban and community planning. The Amman Plan is being developed in seven planning phases covering a metropolitan growth plan, a transportation and transit plan, an integrated servicing infrastructure plan etc. Over all the Amman development plan implementation calls for an estimated investment capital of millions JD by 2025.</p>
<p>i. Description of financing sources used by CPA (program funds/equity/debt/others)</p>	<p>The total investment cost of the CPA is estimated at 5,7 M\$ for the households Incandescent Lamps replacement by CFLs.</p> <p>The estimation of the CPA investment cost is based on a preliminary project concept definition. A survey on the households lighting practices should be carried out for the project design and for the precise investment cost evaluation.</p> <p>Various financial schemes for the project implementation have been tested in many countries. They range from free CFL distribution to partial subsidy or full cost with payments through electricity bills or salary deductions, etc.</p> <p>The financing scheme is to be determined at subsequent project's development stage.</p>
<p>DESCRIPTION OF PROJECT ACTIVITY (policy, technology, other details)</p>	<p>The proposed CPA aims at the extensive use of efficient lighting lamps in the Greater Amman Area (GAA).</p> <p>Various energy efficient lighting options exist: Compact Fluorescent Lamps (CFL) – Fluorescent tube lights, Electronic Ballasts, Light Emitting Diodes (LEDs), Street Lighting, etc.</p> <p>The proposed CPA consists of a large scale use of CFLs for households' and buildings lighting in the GAA. The proposed CPA will help replace the current widely used non efficient Incandescent Lamps (IL) by CFLs. It will contribute to substantial electricity savings and thus will help reduce the emissions of Green House Gases (GHG) associated with fossil fuels electricity generation.</p> <p>Electricity use of lighting is estimated at 1 800 GWh/year representing more than 18% of the total electricity consumption in Jordan. Moreover, lighting contributes significantly to the power peak load resulting in additional investment requirements in the generation capacity to meet the electricity demand. It should be noted that the use of efficient lighting has a potential of 40% to 70% electricity savings</p>

	<p>In fact most of the large scale efficient lighting projects are driven by the objective of addressing peak power shortages, load shedding, etc. The proposed program has a three fold benefit a) energy savings and reduced monthly electricity bills for the consumers ii) power peak demand reduction iii) reduction of the GHG emissions associated with the electricity generation.</p> <p>The proposed CPA aims at the replacement of 1,74 million IL with CFLs. The project is expected to reach a household penetration rate of 40% (8% a year) after five years operational period. The following table summarizes the planned replacement program targets at the end of the CPA deployment period.</p> <table border="1" data-bbox="608 602 1543 792"> <thead> <tr> <th>Lamps</th> <th>Number</th> <th>Baseline</th> </tr> </thead> <tbody> <tr> <td>15 W IL (households)</td> <td>1 040 000</td> <td>IL 60 W</td> </tr> <tr> <td>20 W IL (households)</td> <td>700 000</td> <td>IL 100 W</td> </tr> <tr> <td>Total</td> <td>1 740 000</td> <td></td> </tr> </tbody> </table> <p>Although the CPA scope has been determined on households penetration rate, the CPA targets also commercial and administrative buildings.</p> <p>The proposed CPA will support the GoJ objective for rational use of energy and the renewable energy development. In this regards, it is worth mentioning that a draft of an Energy and Mining law has been prepared and is currently in the process of validation and approval. The law provides for financial incentives for the development of RE in Jordan and for the establishment of a Renewable Energy and Energy Efficiency Fund REEF.</p> <p>As an energy efficiency project, the proposed CPA is eligible for CDM and could benefit from the REEF's financial subsidies/grants.</p>	Lamps	Number	Baseline	15 W IL (households)	1 040 000	IL 60 W	20 W IL (households)	700 000	IL 100 W	Total	1 740 000	
Lamps	Number	Baseline											
15 W IL (households)	1 040 000	IL 60 W											
20 W IL (households)	700 000	IL 100 W											
Total	1 740 000												
LOCATION OF THE PROJECT ACTIVITY	<p>The proposed project is located throughout the Greater Amman Area</p>												
BASELINE SCENARIO must result in GHG emissions being lower than "business-as-usual" in the Host Country. At the PIN stage questions to be answered are at least: <ul style="list-style-type: none"> • Which emissions are being reduced by the proposed CDM/JI program? • What would the future look like without the proposed CDM/JI program? <i>About ½ - 1 page</i>	<p>The current lighting practice is the incandescent lamps use by households and in commercial and administrative buildings. The proposed CPA envisions the replacement of all IL by more energy efficient lamps namely CFLs.</p> <p>In the absence of the project activity, lighting in the GAA will continue on the same current inefficient lighting practice resulting thereby in increased electricity consumption and peak demand as well as GHG emissions that could be prevented.</p>												
PROJECT SCENARIO	<p>By promoting energy efficient lighting, the proposed CPA will help divert part of the current electricity used for lighting to more productive uses contributing to the achievement of the GoJ goal of energy rational use.</p>												

METHODOLOGY TO BE USED

Three approved methodologies could be used for the proposed CPA:

1) Large scale approved methodology AM0046



UNFCCC/CCNUCC



CDM – Executive Board

AM0046 / Version 02
Sectoral Scope: 03
EB 35

Approved baseline and monitoring methodology AM0046

“Distribution of efficient light bulbs to households”

Applicability:

- ✚ For households lighting only;
- ✚ Replacement of incandescent lamps of 100 W or less by more efficient light bulbs.
- ✚ Recollection and distribution of the replaced light bulbs
- ✚ Implementation of a social lottery system among all households included in the baseline sample group (See details in the mythology
- ✚ Definition a Baseline Sample Group (BSG) and a Project Sampling Group (PSG)
- ✚ Spot checks for the monitoring of lighting habits of both the BSG et the PSG

This implementation of this methodology is limited to households lighting and its application is complex.

2) Small scale approved methodology AMS-IIJ: demand side activities for efficient lighting



UNFCCC/CCNUCC



CDM – Executive Board

II.J./Version 03
Sectoral Scope: 03
EB 47

Indicative simplified baseline and monitoring methodologies
for selected small-scale CDM project activity categories

TYPE II - ENERGY EFFICIENCY IMPROVEMENT PROJECTS

Project participants shall take into account the general guidance to the methodologies, information on additionality, abbreviations and general guidance on leakage provided at:
<<http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html>>

II.J. Demand-side activities for efficient lighting technologies

Applicability: this methodology comprises project activities *that lead to efficient use of electricity through the adoption of self-ballasted compact fluorescent lamps (CFLs) to replace incandescent lamps (ILs) in residential applications. Eligible self-ballasted CFLs have ballasts integrated to the lamp as a non-removable part. The CFLs adopted to replace existing equipment must be new equipment not transferred from another activity.*

This methodology is limited to the replacement of ILs by CFLs in residential applications. Moreover daily lighting are limited to 3,5 hours and with this methodology, *Certified Emission Reductions can only be earned only for the rated lifetime (rated life to 50% failures) of project CFLs, not to exceed one crediting period of up to 10 years.*

	<p>The monitoring is done by sampling. The size of the sample is determined by minimum 90% confidence interval and the 10% maximum error margin; the size of the sample shall be no less than 100 (See the methodology II-J for more details).</p> <p>This methodology is limited to households lightings and its imposes a high failure rate of 50% which reduces substantially the expected carbon credits of the project</p> <p>3) Small scale approved methodology AMS-IIC: II.C. Demand-side energy efficiency activities for specific technologies</p> <div style="text-align: center;">  UNFCCC/CCNUCC  </div> <hr/> <div style="display: flex; justify-content: space-between;"> CDM – Executive Board II.C./Version 13 Sectoral Scope: 03 EB 48 </div> <p style="text-align: center; font-size: small;">Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories</p> <hr/> <div style="border: 1px solid black; padding: 2px; text-align: center;">TYPE II - ENERGY EFFICIENCY IMPROVEMENT PROJECTS</div> <p style="font-size: x-small;">Project participants shall take into account the general guidance to the methodologies, information on additionality, abbreviations and general guidance on leakage provided at http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html.</p> <hr/> <div style="border: 1px solid black; padding: 2px; text-align: center;"><i>II.C. Demand-side energy efficiency activities for specific technologies</i></div> <p>This methodology comprises activities that encourage the adoption of energy-efficient equipment/appliance (e.g., lamps, ballasts, refrigerators, motors, fans, air conditioners, pumping systems) at many sites. These technologies may replace existing equipment or be installed at new sites.</p> <p>The methodology requires the metering the electricity consumption of an appropriate sample fixed randomly before project's start. The monitoring should be carried out continuously for the reference sample during the complete crediting period.</p> <p>The last methodology (AMS II C) is more appropriate for the CPA activity. In fact the first CFL CDM program is based on this small scale methodology (Promotion of Energy-Efficient lighting using Compact Fluorescent Light Bulbs in rural areas in Senegal, CDM PoA under development)</p>
STATUS OF PREPARATION	The project is at the concept design stage
EXPECTED START DATE OF PROJECT	<p>The project activity will require two years preparation for the financial and operational scheme set up.</p> <p>Expected project's start date: 2012</p>

EXPECTED VOLUME OF CER/VER/ERU (based on methodology above)

The values assumed for the main parameters used for the CERs volumes evaluation are summarized in the following table:

Parameter	Units	Value
Average number of 60 W Lamps	Lamps/household	6
Average number of 100 W Lamps	Lamps/household	4
Average daily hours use	Hours	3
Total number of households in GAA		434 806
CFL yearly penetration rate	% households/year	8%
Targeted penetration rate	% households	40%
Adjustment savings factor		
For CFL component	%	25%
Emission factor	t CO2/MWh	0,6128

The table below summarizes the results of the expected CERs evaluation.

Year	Households
Year 1	10 328
Year 2	20 656
Year 3	30 985
Year 4	41 313
Year 5	51 641

After the fifth year, the ERs should be maintained at the 51 600 tCO2 level provided that the lamps are replaced at the expiration of their life time or failure

Besides the energy savings and GHG emissions reduction the CFL program will help offset around 38 MW of peak demand.

C. DESCRIPTION OF **THIRD** PROJECT ACTIVITY – UNDER THE PROGRAM

<p>DETAILS OF FIRST CPA</p> <p>b. Name of the organization c. Contact person d. Contact Details</p>		<p>Greater Amman Municipality (GAM) Eng. Ahmad G. Alhyasat +962 (6) 4765843 alhyasat@.a@ammancity.gov.jo alhyasat@yahoo.com</p>		
<p>h. Summary of experience <i>Describe in not more than 5 lines</i></p>		<p>The Municipality of Greater Amman is Governed by a special legislation and regulations; its City Council is composed of 68 members, working within 14 committees, and headed by the Mayor of Amman. It serves around 40% of Jordan population (2.3 millions) and its mandate extends on some 1700 km2.</p> <p>GAM has developed recently an ambitious Master Development plan based on an innovative approach to metropolitan, urban and community planning. The Amman Plan is being developed in seven planning phases covering a metropolitan growth plan, a transportation and transit plan, an integrated servicing infrastructure plan etc. Over all the Amman development plan implementation calls for an estimated investment capital of millions JD by 2025.</p>		
<p>i. Description of financing sources used by CPA (program funds/equity/debt/others)</p>		<p>The total investment cost of the CPA is estimated at 9,15 M\$ for the efficient street lighting: replacement of Mercury Vapor Lamps (MVL) used for secondary street lighting by High Pressure Sodium lamps (HPS).</p> <p>The financing scheme is to be determined at subsequent project's development stage.</p>		
<p>DESCRIPTION OF PROJECT ACTIVITY (policy, technology, other details)</p>		<p>The proposed CPA aims at the systematic use of efficient lighting lamps in the secondary streets of the Greater Amman Area (GAA).</p> <p>The proposed CPA will help replace the non efficient Mercury Vapor Lamps (MVL) widely used for secondary street lighting to High Pressure Sodium lamps (HPS). It will contribute to substantial electricity savings and thus will help reduce the emissions of Green House Gases (GHG) associated with fossil fuels electricity generation.</p> <p>Electricity use of lighting is estimated at 1 800 GWh/year representing more than 18% of the total electricity consumption in Jordan. Moreover, lighting contributes significantly to the power peak load resulting in additional investment requirements in the generation capacity to meet the electricity demand. It should be noted that the use of efficient lighting has a potential of 40% to 70% electricity savings</p> <p>In fact most of the large scale efficient lighting projects are driven by the objective of addressing peak power shortages, load shedding, etc. The proposed program has a three fold benefit a) energy savings and reduced monthly electricity bills for the consumers ii) power peak demand reduction iii) reduction of the GHG emissions associated with the electricity generation.</p> <p>The proposed CPA aims at the replacement of 100 000 Mercury lamps with HPS.</p>		
		Lamps	Number	Baseline
		70 W HPS	100 000	Mercury 125 W

	<p>The proposed CPA will support of the GoJ for rational use of energy and the renewable energy development. In this regards, it is worth mentioning that a draft of an Energy and Mining law has been prepared and is currently in the process of validation and approval. The law provides for financial incentives for the development of RE in Jordan and for the establishment of a Renewable Energy and Energy Efficiency Fund REEF.</p> <p>As an energy efficiency project, the proposed CPA is eligible for CDM and could benefit from the REEF's financial subsidies/grants.</p>
<p>LOCATION OF THE PROJECT ACTIVITY</p>	<p>The proposed project is located throughout the Greater Amman Area</p>
<p>BASELINE SCENARIO must result in GHG emissions being lower than "business-as-usual" in the Host Country. At the PIN stage questions to be answered are at least:</p> <ul style="list-style-type: none"> • Which emissions are being reduced by the proposed CDM/JI program? • What would the future look like without the proposed CDM/JI program? <p><i>About ½ - 1 page</i></p>	<p>For street lighting, two type of lamps are currently used in GAA, namely HPS (250 W and 400W) for large streets and tunnels and MVL (125 W) in secondary and small streets. The proposed CPA envisions the replacement of all MVL by more energy efficient lamps namely HPS lamps.</p> <p>In the absence of the project activity, lighting in the GAA will continue on the same current inefficient lighting practice resulting thereby in increased electricity consumption and peak demand as well as GHG emissions that could be prevented.</p>
<p>PROJECT SCENARIO</p>	<p>By promoting energy efficient lighting, the proposed CPA will help divert part of the current electricity used for lighting to more productive uses contributing to the achievement of the GoJ goal of energy rational use.</p>
<p>METHODOLOGY TO BE USED</p>	<p>Small scale approved methodology AMS-IIC: II.C. Demand-side energy efficiency activities for specific technologies, could be used for the proposed CPA:</p> <div style="text-align: center;">  UNFCCC/CCNUCC  </div> <p style="text-align: center;">CDM – Executive Board II.C./Version 13 Sectoral Scope: 03 EB 48</p> <p style="text-align: center;"><i>Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories</i></p> <hr/> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>TYPE II - ENERGY EFFICIENCY IMPROVEMENT PROJECTS</p> </div> <p>Project participants shall take into account the general guidance to the methodologies, information on additionality, abbreviations and general guidance on leakage provided at http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html.</p> <hr/> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><i>II.C. Demand-side energy efficiency activities for specific technologies</i></p> </div> <p>This methodology comprises activities that encourage the adoption of energy-efficient equipment/appliance (e.g., lamps, ballasts, refrigerators, motors, fans, air conditioners, pumping systems) at many sites. These technologies may replace existing equipment or be installed at new sites.</p> <p>The methodology requires the metering the electricity consumption of an appropriate sample fixed randomly before project's start. The monitoring should be carried out continuously for the reference sample during the complete crediting period.</p>

	The last methodology (AMS II C) is more appropriate for the CPA activity. In fact the first CFL CDM program is based on this small scale methodology (Promotion of Energy-Efficient lighting using Compact Fluorescent Light Bulbs in rural areas in Senegal, CDM PoA under development)
STATUS OF PREPARATION	The project is at the concept design stage
EXPECTED START DATE OF PROJECT	The project activity will require one year preparation for the financial and operational scheme set up. One Expected project's start date: 2011

EXPECTED VOLUME OF CER/VER/ERU (based on methodology above)	The values assumed for the main parameters used for the CERs volumes evaluation are summarized in the following table:																									
	<table border="1"> <thead> <tr> <th>Parameter</th> <th>Units</th> <th>Street lighting cost</th> </tr> </thead> <tbody> <tr> <td>Project developpement cost</td> <td>\$</td> <td>100 000</td> </tr> <tr> <td>HPS</td> <td></td> <td></td> </tr> <tr> <td>Number</td> <td></td> <td>100 000</td> </tr> <tr> <td>Unit cost</td> <td>\$</td> <td>90</td> </tr> <tr> <td>Total Cost</td> <td>\$</td> <td>9 000 000</td> </tr> <tr> <td>Implementation cost</td> <td>\$</td> <td>50 000</td> </tr> <tr> <td>Sub total</td> <td>\$</td> <td>9 150 000</td> </tr> </tbody> </table>			Parameter	Units	Street lighting cost	Project developpement cost	\$	100 000	HPS			Number		100 000	Unit cost	\$	90	Total Cost	\$	9 000 000	Implementation cost	\$	50 000	Sub total	\$
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	The expected CERs have been evaluated at 11 500 tCO2/year.																									

D. DESCRIPTION OF THE **FOURTH** PROJECT ACTIVITY – UNDER THE PROGRAM

<p>DETAILS OF FIRST CPA</p> <p>b. Name of the organization</p> <p>c. Contact person</p> <p>d. Contact Details</p>	<p>Greater Amman Municipality (GAM)</p> <p>Eng. Ahmad G. Alhyasat</p> <p>+962 (6) 4765843</p> <p>alhyasat@.a@ammancity.gov.jo</p> <p>alhyasat@yahoo.com</p>
<p>h. Summary of experience</p> <p><i>Describe in not more than 5 lines</i></p>	<p>The Municipality of Greater Amman is Governed by a special legislation and regulations; its City Council is composed of 68 members, working within 14 committees, and headed by the Mayor of Amman. It serves around 40% of Jordan population (2.3 millions) and its mandate extends on some 1700 km2.</p> <p>GAM has developed recently an ambitious Master Development plan based on an innovative approach to metropolitan, urban and community planning. The Amman Plan is being developed in seven planning phases covering a metropolitan growth plan, a transportation and transit plan, an integrated servicing infrastructure plan etc. Over all the Amman development plan implementation calls for an estimated investment capital of millions JD by 2025.</p>
<p>i. Description of financing sources used by CPA (program funds/equity/debt/others)</p>	<p>The total investment cost of the CPA is estimated at 43 M\$ for the installation of 42 500 Solar Water Heaters SWH over five years</p> <p>The estimation of the CPA investment cost is based on a preliminary project concept definition. A survey on the households' water heating practices should be carried out for the project design and for the precise investment cost evaluation.</p> <p>Various financial schemes for the project implementation have been tested in many countries. They comprise direct subsidies, soft loans, re-payments schemes, leasing or rental programs, etc.</p> <p>The CPA's financing scheme is to be determined at subsequent project's development stage.</p>
<p>DESCRIPTION OF PROJECT ACTIVITY (policy, technology, other details)</p>	<p>Jordan enjoys a high potential of solar energy (5.6 kWh/ m2.day) and solar applications are very common: water heating, space heating, crop and vegetable drying.</p> <p>It is estimated that about 15% of households in Jordan use SWH as the main energy source for water heating.</p> <p>According to the National Energy Renewable Centre (NERC), there are over 30 local manufacturers of solar collectors in Jordan, most of them located in Amman. However, only two of these manufacturers produce collectors in accordance with the RSS design criteria. The annual production rate is around 4,000 units. Solar collectors are also imported mainly from Turkey and Europe.</p> <p>Despite the existence of a local SWH industry and the current fair penetration rate, the potential of solar energy is still underexploited. This could be explained by the various regulatory, technical, financial and commercial barriers the large scale deployment of SWH is facing.</p>

	<p>The proposed CPA aims at the wide spread use of SWH for households in the Greater Amman Area (GAA).</p> <p>The CPA implementation will help achieve the Energy Strategy target to improve the current penetration rate of SWH in Jordan from 15% to 25% by 2015.</p> <p>A total of 42 000 household SWH should be installed in five years period representing a total of 107 000 m2. The total installed capacity is estimated at 70 MW peak. With the CPA implemented it is expected that the penetration rate will reach 25% in the GAA by the end of the program achieving thereby the objective of the Jordan Energy Strategy for the solar water heating systems.</p> <p>A diagnosis of the current SWH market will be carried out for the CPA concept design to better assess the demand and help identify the barriers to the widespread of SWH in Jordan. The CPA concept will integrate the solutions to the identified barriers as well as lessons learned from SWH programs' implementation in others countries.</p>
<p>LOCATION OF THE PROJECT ACTIVITY</p>	<p>The proposed project is located throughout the Greater Amman Area</p>
<p>BASELINE SCENARIO must result in GHG emissions being lower than "business-as-usual" in the Host Country. At the PIN stage questions to be answered are at least:</p> <ul style="list-style-type: none"> • Which emissions are being reduced by the proposed CDM/JI program? • What would the future look like without the proposed CDM/JI program? <p><i>About ½ - 1 page</i></p>	<p>The current practice of the water heating in Jordan is dominated by fossil fuels based system (gas and kerosene/Diesel) and accessorially electricity.</p> <p>In the absence of the project activity, the demand for SWH will still be modest and most solar water heating systems will continue using mostly fossil fuel and thus generating GHG emissions that could be prevented.</p> <p>For the ERs evaluation it is assumed that only 20% of the envisioned SWH would have been installed in the absence of the CPA.</p>
<p>PROJECT SCENARIO</p>	<p>By promoting solar energy, the proposed CPA will help divert part of the current fossil fuels and electricity used for households' water heating to more productive uses contributing to the achievement of the GoJ of Renewable Energy development goal.</p>
<p>METHODOLOGY TO BE USED</p>	<p>The small scale methodology AMS I.C : thermal energy for the user, is perfectly suited for the proposed CPA.</p> <p><i>This methodology comprises renewable energy technologies that supply users with thermal energy that displaces fossil fuel use. These units include technologies such as solar thermal water heaters and dryers, solar cookers, energy derived from renewable biomass and other technologies that provide thermal energy that displaces fossil fuel.</i></p> <p>Note that this methodology is valid for individual CPAs in the limit of 64 000 m2 of total collectors surface. To avoid using a more complex large scale approved methodology, it is recommended to carry out the SWH program in two separate zones of the GAA define accordingly two independent SWH CPAs for the PoA.</p>

STATUS OF PREPARATION	The project is at the concept design stage																																																																								
EXPECTED START DATE OF PROJECT	<p>The project activity will require 18 months preparation for the financial and operational scheme set up.</p> <p>Expected project's start date: Mid 2011</p>																																																																								
<p>EXPECTED VOLUME OF CER/VER/ERU (based on methodology above)</p>	<p>The values assumed for the main parameters used for the CERs volumes evaluation are summarized in the following table:</p> <table border="1" data-bbox="608 499 1485 1084"> <thead> <tr> <th>Parameter</th> <th>Unit</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>Installation rate</td> <td>Units/year</td> <td>8 500</td> </tr> <tr> <td>Program implementation period</td> <td>years</td> <td>5,0</td> </tr> <tr> <td>Solar Unit used</td> <td></td> <td></td> </tr> <tr> <td> Person per household</td> <td></td> <td>5,0</td> </tr> <tr> <td>Water requirement</td> <td>l/day</td> <td>250,0</td> </tr> <tr> <td>Water temperature</td> <td>°C</td> <td>60,0</td> </tr> <tr> <td>Panel surface</td> <td>m²</td> <td>2,5</td> </tr> <tr> <td>Capacity</td> <td>kW</td> <td>1,6</td> </tr> <tr> <td>Cost</td> <td>\$/m²</td> <td>400,0</td> </tr> <tr> <td>Increase rate without CPA</td> <td>Units/year</td> <td>1 700</td> </tr> <tr> <td>Energy currently used for water heating</td> <td></td> <td></td> </tr> <tr> <td> Solar</td> <td>%</td> <td>15%</td> </tr> <tr> <td> Electricity</td> <td>%</td> <td>20%</td> </tr> <tr> <td> Gas or kerosene/diesel</td> <td>%</td> <td>65%</td> </tr> </tbody> </table> <p>The table below summarizes the results of the expected CERs evaluation.</p> <table border="1" data-bbox="671 1178 1465 1529"> <thead> <tr> <th rowspan="2">Year</th> <th colspan="3">ER tCO₂</th> </tr> <tr> <th>SWH program</th> <th>Without CPA</th> <th>Additional due to the CPA</th> </tr> </thead> <tbody> <tr> <td>Year 1</td> <td>10 200</td> <td>2 040</td> <td>8 160</td> </tr> <tr> <td>Year 2</td> <td>17 425</td> <td>3 485</td> <td>13 940</td> </tr> <tr> <td>Year 3</td> <td>24 650</td> <td>4 930</td> <td>19 720</td> </tr> <tr> <td>Year 4</td> <td>31 875</td> <td>6 375</td> <td>25 500</td> </tr> <tr> <td>Year 5</td> <td>39 100</td> <td>7 820</td> <td>31 280</td> </tr> </tbody> </table> <p>After the fifth year the ERs should reach a level of 31 800 tCO₂ level.</p>	Parameter	Unit	Value	Installation rate	Units/year	8 500	Program implementation period	years	5,0	Solar Unit used			Person per household		5,0	Water requirement	l/day	250,0	Water temperature	°C	60,0	Panel surface	m ²	2,5	Capacity	kW	1,6	Cost	\$/m ²	400,0	Increase rate without CPA	Units/year	1 700	Energy currently used for water heating			Solar	%	15%	Electricity	%	20%	Gas or kerosene/diesel	%	65%	Year	ER tCO ₂			SWH program	Without CPA	Additional due to the CPA	Year 1	10 200	2 040	8 160	Year 2	17 425	3 485	13 940	Year 3	24 650	4 930	19 720	Year 4	31 875	6 375	25 500	Year 5	39 100	7 820	31 280
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E. DESCRIPTION OF THE **FIFTH** PROJECT ACTIVITY – UNDER THE PROGRAM

<p>DETAILS OF FIRST CPA</p> <p>b. Name of the organization</p> <p>c. Contact person</p> <p>d. Contact Details</p>	<p>Greater Amman Municipality (GAM)</p> <p>Eng. Ahmad G. Alhyasat</p> <p>+962 (6) 4765843</p> <p>alhyasat@.a@ammancity.gov.jo</p> <p>alhyasat@yahoo.com</p>															
<p>h. Summary of experience</p> <p><i>Describe in not more than 5 lines</i></p>	<p>The Municipality of Greater Amman is Governed by a special legislation and regulations; its City Council is composed of 68 members, working within 14 committees, and headed by the Mayor of Amman. It serves around 40% of Jordan population (2.3 millions) and its mandate extends on some 1700 km2.</p> <p>GAM has developed recently an ambitious Master Development plan based on an innovative approach to metropolitan, urban and community planning. The Amman Plan is being developed in seven planning phases covering a metropolitan growth plan, a transportation and transit plan, an integrated servicing infrastructure plan etc. Over all the Amman development plan implementation calls for an estimated investment capital of millions JD by 2025.</p>															
<p>i. Description of financing sources used by CPA (program funds/equity/debt/others)</p>	<p>The total investment cost of the CPA is estimated at 45,4 M\$ for the establishment of a new slaughter house facility servicing the greater Amman area including Al-Russayfeh and Al-Zarqa.</p> <p>The estimation of the CPA investment cost is based on the project's feasibility study dated March 2009.</p> <p>The project is to be implemented on a DBOT basis over a 25 period. An international bid will be issued by GAM for the selection of an investor to undertake the tasks of designing, building and operating the new slaughterhouse on a plot of land granted by GAM.</p> <p>The proposed sources of the project's financing are as follows:</p> <table border="1" data-bbox="683 1406 1453 1637"> <thead> <tr> <th>Source</th> <th>Amount in '000 JD</th> <th>Amount in '000 \$</th> </tr> </thead> <tbody> <tr> <td>Total equity DBOT partner</td> <td>6 500</td> <td>9 183</td> </tr> <tr> <td>Grant by GAM</td> <td>10 000</td> <td>14 128</td> </tr> <tr> <td>Total long-term loans</td> <td>15 610</td> <td>22 054</td> </tr> <tr> <td>Total</td> <td>31 110</td> <td>45 365</td> </tr> </tbody> </table>	Source	Amount in '000 JD	Amount in '000 \$	Total equity DBOT partner	6 500	9 183	Grant by GAM	10 000	14 128	Total long-term loans	15 610	22 054	Total	31 110	45 365
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<p>DESCRIPTION OF PROJECT ACTIVITY (policy, technology, other details)</p>	<p>GAM has decided to establish a new slaughter house servicing the greater Amman area including Al-Russayfeh and Al-Zarqa. The project aims at the development of a new modern slaughterhouse facility in accordance with national and international technical and hygiene standards.</p> <p>The project is to be implemented in partnership with a private operator on a DBOT basis. The qualified investor will take in charge the design, building and operating of the new facility for 25 years. The project site has been selected and the land plot will be granted by GAM.</p>															

	<p>The project's feasibility study has been done and the EIA of the project is underway.</p> <p>The new facility will provide for slaughtering services, slaughtering inspection services, meat inspection, sales of by-products (hearts, livers, skins etc.) storage services, freezing store services, biogas capture and electricity generation as well as waste water treatment and water reuse for irrigation.</p> <p>The new slaughter house facility will be designed to handle, at full capacity, 41 600 cattle/camels, 624 000 sheep/goats and 12 480 000 birds per annum.</p>
<p>LOCATION OF THE PROJECT ACTIVITY</p>	<p>The proposed project is located 5 km south of Amman near the power station.</p>
<p>BASELINE SCENARIO must result in GHG emissions being lower than "business-as-usual" in the Host Country. At the PIN stage questions to be answered are at least:</p> <ul style="list-style-type: none"> • Which emissions are being reduced by the proposed CDM/JI program? • What would the future look like without the proposed CDM/JI program? <p><i>About ½ - 1 page</i></p>	<p>The new slaughterhouse facility is to be equipped with a biological waste water treatment plant. Biogas generated from the anaerobic treatment of the charged wastewater will be captured and use for electricity generation.</p> <p>The electricity produced will be used directly in the slaughter house providing for around 60% of the facility electricity needs (see project's feasibility study).</p> <p>In the absence of the proposed CPA, the biogas will be emitted to the atmosphere and the slaughter house will ensure its electricity supply from the grid electricity.</p> <p>According to the project's feasibility study, at full capacity, an estimated 6 263 MWh a year will be generated from the captured biogas.</p>
<p>PROJECT SCENARIO</p>	<p>The project scenario consists of the construction of a slaughter house facility with a waste water treatment plant, the capture of the biogas associated with the treatment plant and electricity generation.</p> <p>By using a renewable source namely biogas, the proposed CPA will help divert part of the electricity that will be used in the slaughter house facility to more productive uses contributing to GHG emissions reduction and to the achievement of the GoJ goal of Renewable Energy development.</p> <p>Note that the new slaughter house project might offer other CDM opportunities (solid waste treatment (already done in Ruseifeh landfill), process energy efficiency, waste water treatment, etc. However, the establishment of the baseline emissions of these projects should be hard to justify.</p>
<p>METHODOLOGY TO BE USED</p>	<p>The approved small scale methodology: AMS I.D : <i>Grid connected renewable electricity generation</i>, is perfectly suited for the activity.</p> <p>This methodology <i>comprises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit.</i></p>

STATUS OF PREPARATION	The project's feasibility study has been done. The EIA is underway and the DBOT bidding process has been launched.
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EXPECTED START DATE OF PROJECT	The project activity will require two years construction period. Expected project's start date: 2012
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EXPECTED VOLUME OF CER/VER/ERU (based on methodology above)	<p>The expected ERs production schedule is presented in the following table:</p> <table border="1"> <thead> <tr> <th>Year</th> <th>% capacity</th> <th>MWh/a</th> <th>tCO2/year</th> </tr> </thead> <tbody> <tr><td>1</td><td>63%</td><td>3 966</td><td>2 430</td></tr> <tr><td>2</td><td>67%</td><td>4 189</td><td>2 567</td></tr> <tr><td>3</td><td>71%</td><td>4 424</td><td>2 711</td></tr> <tr><td>4</td><td>75%</td><td>4 673</td><td>2 864</td></tr> <tr><td>5</td><td>79%</td><td>4 936</td><td>3 025</td></tr> <tr><td>6</td><td>83%</td><td>5 214</td><td>3 195</td></tr> <tr><td>7</td><td>88%</td><td>5 508</td><td>3 375</td></tr> <tr><td>Subtotal 1</td><td></td><td></td><td>20 168</td></tr> <tr><td>8</td><td>93%</td><td>5 819</td><td>3 566</td></tr> <tr><td>9</td><td>98%</td><td>6 146</td><td>3 766</td></tr> <tr><td>10</td><td>104%</td><td>6 494</td><td>3 979</td></tr> <tr><td>11</td><td>110%</td><td>6 861</td><td>4 204</td></tr> <tr><td>12</td><td>116%</td><td>7 249</td><td>4 442</td></tr> <tr><td>13</td><td>122%</td><td>7 659</td><td>4 693</td></tr> <tr><td>14</td><td>129%</td><td>8 092</td><td>4 959</td></tr> <tr><td>Subtotal 2</td><td></td><td></td><td>29 610</td></tr> <tr><td>15</td><td>137%</td><td>8 551</td><td>5 240</td></tr> <tr><td>16</td><td>144%</td><td>9 019</td><td>5 527</td></tr> <tr><td>17</td><td>152%</td><td>9 520</td><td>5 834</td></tr> <tr><td>18</td><td>161%</td><td>10 084</td><td>6 180</td></tr> <tr><td>19</td><td>170%</td><td>10 648</td><td>6 525</td></tr> <tr><td>20</td><td>180%</td><td>11 274</td><td>6 909</td></tr> <tr><td>21</td><td>190%</td><td>11 900</td><td>7 293</td></tr> <tr><td>Subtotal 3</td><td></td><td></td><td>43 507</td></tr> <tr><td>TOTAL</td><td></td><td>152 228</td><td>93 285</td></tr> </tbody> </table> <p>The above yearly production capacity and electricity generation has been established by the project's feasibility study. The resulting average yearly CERs over the crediting period is evaluated at 4 442 t CO2/year.</p>	Year	% capacity	MWh/a	tCO2/year	1	63%	3 966	2 430	2	67%	4 189	2 567	3	71%	4 424	2 711	4	75%	4 673	2 864	5	79%	4 936	3 025	6	83%	5 214	3 195	7	88%	5 508	3 375	Subtotal 1			20 168	8	93%	5 819	3 566	9	98%	6 146	3 766	10	104%	6 494	3 979	11	110%	6 861	4 204	12	116%	7 249	4 442	13	122%	7 659	4 693	14	129%	8 092	4 959	Subtotal 2			29 610	15	137%	8 551	5 240	16	144%	9 019	5 527	17	152%	9 520	5 834	18	161%	10 084	6 180	19	170%	10 648	6 525	20	180%	11 274	6 909	21	190%	11 900	7 293	Subtotal 3			43 507	TOTAL		152 228	93 285
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F. DESCRIPTION OF THE **SIXTH** PROJECT ACTIVITY – UNDER THE PROGRAM

<p>DETAILS OF FIRST CPA</p>																					
<p>b. Name of the organization</p>	<p>GAM</p>																				
<p>c. Contact person</p>	<p>Dr. Ayman Smadi Transportation and Traffic Management Director</p>																				
<p>d. Contact Details</p>	<p>Mobile: +962-799049808 Fax/ +962-64765829 Ayman.smadi@ammancity.gov.jo</p>																				
<p>h. Summary of experience <i>Describe in not more than 5 lines</i></p>	<p>The Municipality of Greater Amman is Governed by a special legislation and regulations; its City Council is composed of 68 members, working within 14 committees, and headed by the Mayor of Amman. It serves around 40% of Jordan population (2.3 millions) and its mandate extends on some 1700 km2.</p> <p>GAM has developed recently an ambitious Master Development plan based on an innovative approach to metropolitan, urban and community planning. The Amman Plan is being developed in seven planning phases covering a metropolitan growth plan, a transportation and transit plan, an integrated servicing infrastructure plan etc. Over all the Amman development plan implementation calls for an estimated investment of _____ millions JD by 2025.</p>																				
<p>i. Description of financing sources used by CPA (program funds/equity/debt/others)</p>	<p>The total investment cost of the transport optimization program is estimated as follows:</p> <table border="1" data-bbox="711 1093 1450 1366"> <thead> <tr> <th>Phase</th> <th>Activity</th> <th>Cost in M\$</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Phase I</td> <td>BRT</td> <td>220</td> </tr> <tr> <td>Rail</td> <td>1 200</td> </tr> <tr> <td>Terminals</td> <td>70</td> </tr> <tr> <td rowspan="3">Phase II</td> <td>BRT</td> <td>145</td> </tr> <tr> <td>Rail</td> <td>900</td> </tr> <tr> <td>Terminals</td> <td>80</td> </tr> <tr> <td colspan="2">TOTAL</td> <td>2 615</td> </tr> </tbody> </table> <p>Phase I: 2010-2015 Phase II: 2015-2025</p> <p>The financing scheme is to be determined at subsequent project's development stage.</p>	Phase	Activity	Cost in M\$	Phase I	BRT	220	Rail	1 200	Terminals	70	Phase II	BRT	145	Rail	900	Terminals	80	TOTAL		2 615
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<p>DESCRIPTION OF PROJECT ACTIVITY (policy, technology, other details)</p>	<p>The proposed CPA consists of the implementation of a comprehensive transport optimization action plan for the GAA calling for the increase of the public transport mode from the current 18% to 40% by 2025. Besides comprehensive transport policies, the action plan envisions the deployment of a Bus Rapid Transit system (BRT), a Rail Road Transit system (RRT) and the use of Compressed Natural Gas (CNG) for vehicles.</p> <p>Fuel switch to CNG is planned for GAM fleet comprising 25 000 Vehicles and Taxis.</p>																				
<p>LOCATION OF THE PROJECT ACTIVITY</p>	<p>The proposed CPA is located in the GAA.</p>																				

<p>BASELINE SCENARIO must result in GHG emissions being lower than “business-as-usual” in the Host Country. At the PIN stage questions to be answered are at least:</p> <ul style="list-style-type: none"> • Which emissions are being reduced by the proposed CDM/JI program? • What would the future look like without the proposed CDM/JI program? <p><i>About ½ - 1 page</i></p>	<p>Amman is a growing city with an estimated population of 2,3 millions. The rapid population growth is expected to continue with GAA population reaching 6,4 millions by 2025.</p> <p>The cars park in Jordan is growing at an estimated average of 10%. Most Amman inhabitants use their cars for transportation. The following table presents the transport repartition mode in Amman city:</p> <table border="1" data-bbox="798 492 1260 649"> <thead> <tr> <th>Transport mode</th> <th>%</th> </tr> </thead> <tbody> <tr> <td>Private car</td> <td>53%</td> </tr> <tr> <td>Bus or minibus</td> <td>18%</td> </tr> <tr> <td>Walking</td> <td>10%</td> </tr> <tr> <td>Other modes</td> <td>19%</td> </tr> </tbody> </table> <p>Source: GAM, transport Department, 2007</p> <p>In the absence of the proposed CPA, most of Amman inhabitants will continue to use their cars due to current deficit and poor quality of public transportation system. According to GAM, public transport in Amman is <i>underdeveloped, unreliable and lacks a well structured hierarchy of transportations modes and services.</i></p> <p>The proposed CPA will provide a high quality public transport service and increase the share of passengers using public transport system. The CPA will thus help reduce the fuel intensity for transport.</p> <p>The CPA will also help switch utilities vehicles (buses and taxis) from gasoline and diesel to a more environmentally friendly fuel namely natural gas. The use of NCV will reduce the emission of GHG mostly CO₂.</p>	Transport mode	%	Private car	53%	Bus or minibus	18%	Walking	10%	Other modes	19%
Transport mode	%										
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Bus or minibus	18%										
Walking	10%										
Other modes	19%										
<p>PROJECT SCENARIO</p>	<p>The project scenario consists of the implementation an optimal transport system based on:</p> <ul style="list-style-type: none"> ✚ Bus Rapid Transit system (BRT), ✚ Rail Road Transit system (RRT) and ✚ Use of Compressed Natural Gas for vehicles 										
<p>METHODOLOGY TO BE USED</p>	<p>The approved CDM methodology AM0031 is suited to the development of the BRT component of the proposed CPA.</p> <div style="text-align: center;">  <p>UNFCCC/CCNUCC</p> <hr/> <p>CDM – Executive Board</p>  <p>AM0031 / Version 01.1 Sectoral Scope: 07 EB 44</p> <p>Approved baseline methodology AM0031</p> <p>“Baseline Methodology for Bus Rapid Transit Projects”</p> </div> <p>For the Natural Gas Vehicles (NGV), the small scale approved methodology AMS III.C, can be used: Emission reductions by low-greenhouse gas emitting vehicles</p>										

	<p style="text-align: center;">TYPE III - OTHER PROJECT ACTIVITIES</p> <p>Project participants shall take into account the general guidance to the methodologies, information on additionality, abbreviations and general guidance on leakage provided at http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html.</p> <p style="text-align: center;">III. C. Emission reductions by low-greenhouse gas emitting vehicles</p> <p>As for the railway component of the project, a new methodology is under validation: NM0258 (variation of AM0031 and NM0266 for Railway Rapid Transit Projects):</p>																																																
STATUS OF PREPARATION	The project is at the concept design stage – A detailed project's feasibility study has been initiated																																																
EXPECTED START DATE OF PROJECT	<p>A two years period is required for the CPAs preparation and the program registration</p> <p>Preparation period: 2010-2011</p> <p>The transport CPA will be carried out in two phases: Phase 1: 2010-2015 : BRT 30 km three routes ; 20 km rail and Intermodal and gateway terminals Phase 2: 2015-2025: BRT 20 km three routes; 20 km rail, gateway terminals and Park and Ride facilities.</p> <p>Expected project's start date: 2012</p>																																																
EXPECTED VOLUME OF CER/VER/ERU (based on methodology above)	<p>The CERs estimation based on the following assumptions and on the objective of reaching a 40% of Amman passengers using public transport in 2025 and the conversation of 25 000 utility vehicles to natural gas is presented below:</p> <table border="1" data-bbox="614 1104 1548 1899"> <thead> <tr> <th>Parameter</th> <th>Unit</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td colspan="3">BRT/RRT</td> </tr> <tr> <td>Number of vehicles a day</td> <td></td> <td>350 000</td> </tr> <tr> <td>Increase rate</td> <td>%</td> <td>5%</td> </tr> <tr> <td>Average number of persons per car</td> <td></td> <td>1,3</td> </tr> <tr> <td>Average distance</td> <td>km/day</td> <td>40</td> </tr> <tr> <td>Average fuel consumption</td> <td>l/km</td> <td>0,1</td> </tr> <tr> <td>Fuel consumption</td> <td>liters/day</td> <td>1 400 000</td> </tr> <tr> <td>People taking public transportation</td> <td>%</td> <td>18%</td> </tr> <tr> <td>Increase rate</td> <td>%</td> <td>5%</td> </tr> <tr> <td>Target public transportation by 2025</td> <td>%</td> <td>40%</td> </tr> <tr> <td colspan="3">Natural Gas Vehicles</td> </tr> <tr> <td>Number of concerned vehicles</td> <td></td> <td>25 000</td> </tr> <tr> <td>Average fuel consumption</td> <td>l/km</td> <td>0,12</td> </tr> <tr> <td>Average distance</td> <td>km/j</td> <td>120</td> </tr> <tr> <td>ER estimated rate</td> <td>%</td> <td>15%</td> </tr> </tbody> </table>	Parameter	Unit	Value	BRT/RRT			Number of vehicles a day		350 000	Increase rate	%	5%	Average number of persons per car		1,3	Average distance	km/day	40	Average fuel consumption	l/km	0,1	Fuel consumption	liters/day	1 400 000	People taking public transportation	%	18%	Increase rate	%	5%	Target public transportation by 2025	%	40%	Natural Gas Vehicles			Number of concerned vehicles		25 000	Average fuel consumption	l/km	0,12	Average distance	km/j	120	ER estimated rate	%	15%
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Year	ER tCO2		
	BRT/RRT	NGV	Total
2012	43 300	10 000	53 300
2013	90 900	20 100	111 000
2014	143 200	30 100	173 300
2015	225 500	40 200	265 700
2016	296 000	50 200	346 200
2017	373 000	50 200	423 200
2018	457 000	50 200	507 200
2020	548 400	50 200	598 600
2021	679 800	50 200	730 000
2022	755 700	50 200	805 900
TOTAL	3 612 800	401 600	4 014 400

The expected CERs annual average over the first ten years is around 401 400 t CO2/year.

The above CERs estimation is based on preliminary assumptions that should be refined once the project feasibility study has been done and the precise CPA concept has been fully determined.

Annexes

Annex A

Terms of reference

**MNA Region - Carbon Finance Assist Program
Support to the development of CDM activities in Jordan**

Terms of Reference for a CDM Consultant

**MNA Region - Carbon Finance Assist Program
Support to the development of a city wide CDM program for Greater Amman Municipality**

Terms of Reference for a CDM Consultant

I. INTRODUCTION

2. The Kyoto Protocol (KP) to the UN Framework Convention on Climate Change (UNFCCC) was agreed upon in December 1997. The Protocol commits industrialized (“Annex I”) countries to reduce their carbon emissions by an average of 5.2 percent below 1990 levels in the first commitment period (2008-2012). To meet these commitments in the most cost-effective manner, the Protocol’s Article 12 established the enabling industrialized countries to receive credits for financing emission reductions (ERs) projects in developing (host) countries. While host countries have no commitments or emission reduction targets under the Protocol, they can benefit from activities under the Clean Development Mechanism (CDM), so that they could maximize their sustainable development gains along with global environmental benefits.

3. CF-Assist is a capacity building and technical assistance program established by the World Bank in fiscal year 2005 to enable the full engagement of developing countries and economies in transition in the carbon market so that they could maximize their sustainable development gains along with global environmental benefits.

4. In this context, the World Bank Institute (WBI), responsible of managing this program, has allocated resources and a budget to be used for CF-Assist activities in Jordan. Following discussions between the World Bank and Greater Amman Municipality (GAM) management, GAM requested technical assistance in assessing CDM opportunities in potential sectors in Amman municipality, to enable the City to participate in the carbon market and benefit from CDM on a City wide approach.

5. Jordan ratified the Kyoto Protocol on January 17, 2003. The programmatic approach to the CDM is a relevant tool which could generate additional financial resources for the implementation of programs under national policies such as Municipal Services areas.

6. The World Bank is hereby seeking consulting services to support GAM in identifying and assessing potential sectors and quantifying the ERs potential, for developing city wide CDM program. To this end, the present Terms References (ToRs) detail the scope of work of the required consulting services for this assignment.

II. OBJECTIVES:

7. The objective of the proposed technical assistance is to assist the Greater Amman Municipality (GAM) in assessing and identifying the potential sectors for developing programmatic CDM activities in municipal services sectors managed by Amman Municipality. More specifically, the proposed assignment will include (i) the assessment and validation of the feasibility of a city wide CDM programmatic project for potential municipal services offered by the Greater Amman Municipality, based on set of criteria to be prepared by the Consultant, including but not limited to readiness of GAM to implement, financing availability, approved methodology, etc. The sectors to be assessed are renewable energy (solar, wind), energy efficiency, wastewater, municipal solid waste and transport

sectors; (ii) Identification of the potential projects/programs in each sector and estimating the emission reduction potential from those project activities and sectors; and (iii) the elaboration of city wide CDM Idea Note (PIN) for the selected potential CPAs. PIN template is attached (Annex 1).

8. The Program Idea Note (PIN) is the first step in the design of the Program of Activities (PoA) leading to the preparation of a CDM PoA-DD and a CDM CPA-DD³ which will be submitted for validation and registration.

9. When preparing the PIN the consultant should refer to the guidance provided by the CDM Executive Board (EB) at its forty-seventh meeting⁴ for PoA and activities under PoA (CPAs) and any other further relevant EB guidance on PoAs.

III. TASKS:

10. Consistent with the above objectives, the assignment comprises of two main tasks for the consultant, which will include, but not limited to:

11. Development of a set of criteria for assessment of projects for further development. Criteria include but are not limited to readiness of GAM to implement, financing availability, approved methodology, expected implementation / construction / operation date, etc.

12. Assessment of the Greater Amman Municipality services and investment plans for the feasibility of a city wide CDM program, based on the criteria defined above.

13. Assessment of renewable energy (solar, wind), energy efficiency, wastewater, and transport sectors. Identify sectors and projects with CDM potential and develop a pipeline of CPAs (CDM project activities) based on Program of Activities (POA) approach.

14. Based on the pipeline developed and identified, determine the most eligible (prioritize) CDM project activities that can be considered potential candidate and prepare a list of data / information / checklist that needs to be prepared and provided by GAM, which should include but not limited to the scope and the objectives of the CPA; the cost estimate and financing scheme, implementation schedule, the institutional arrangements and implementing entities etc. in order to validate the feasibility of the proposed CPAs.

15. Validate the selected potential CPAs, and elaborate the Program Idea Note (PIN) :

- 3- Collect relevant information for the preparation of the Program Idea Note (PIN) and the individual CPAs.
- 4- Liaise with other consultants (legal, technical, environmental, etc.) recruited by the Greater Amman Municipality for the preparation of this Municipal Services PoA and take into account, whenever relevant, the findings of their respective due diligence.
- 5- Determine a likely scenario for the portfolio of projects (CPAs) that will be included in this City wide PoAs and estimate the total amount of Emission Reductions (ERs) generated from each CPA.
- 6- Provide a preliminary analysis of baseline and additionality.

⁴ The latest version of the templates for CDM-PoA-DD and CDM-CPA-DD are available on the UNFCCC CDM website in the reference/documents section.

⁴ EB47, Annex 29

- 7- Based on the information collected from GAM, consistent with the agreed scenario for the portfolio of projects, prepare a financial analysis required for the POA and the CPAs using the format prescribed by the World Bank.
- 8- Prepare a brief summary of the major environmental and socio-economic benefits (local and global) expected from the POA and CPAs.
- 9- Complete the PIN sections as needed.

16. To achieve the tasks stated above the consultant will undertake one or two country missions to Amman as needed between January 15, 2009 and August 15, 2009 in order to meet with the Greater Amman Municipality and other concerned Jordan stakeholders (the Ministry of Environment, the Ministry of Energy and Mineral Resources, Electricity generation and distribution utilities, etc.) to collect information needed for completion of the assignment.

IV. WORK ORGANISATION & REPORTING

13. The Consultant will report to the MNA-Regional Carbon Finance Team at the World Bank, coordinated by xxxxx. He/she will work closely with the Greater Amman Municipality and others local/national concerned institutions in Jordan as needed.

14. Under the proposed assignment, the consultant will prepare and submit the following documents:

- a) List of criteria.
- b) Concise report comprising list of the entire pipeline across sectors, all possible projects (CPAs) identified in the city with assessment based on the criteria, and list of the priority projects.
- c) Draft version of the PIN with a 1 pager for each of the identified / selected CDM project activities (CPAs) no later than 6 weeks after the signature of his/her contract.
- d) Final version of the PIN (including Financial Analysis Tables for each of the CPAs for which the needed financial data is available) and implementation schedule, two weeks after receiving comments from the Greater Amman Municipality and the Bank.
- e) Two copies of the completion reports summarizing the key results and findings of the provided TA as well as recommendations for the preparation of further steps towards the preparation of the POA and CPAs.

15. All documents should be produced in English and submitted electronically (word and excel documents) and in hard copy.

V. REQUIRED QUALIFICATIONS

16. The required main qualifications of the individual consultant are:

- a) Formal educational background in a directly related technical field as an engineer or minimum master's level of education.
- b) At least 5 years diversified work experience in CDM project development, at least covering renewable energy, energy efficiency and wastewater sectors, excellent knowledge of CDM program of activities is a plus.
- c) Fluency in English required with excellent written and oral communication skills. Knowledge of Arabic will be an asset.

VI LEVEL OF EFFORT

17. The proposed assignment is expected to require 35 days of full-time work for the completion of activities including two one week missions in Amman City .

18. The proposed assignment is expected to be carried between January 15 2009 and September 30, 2009.

VII. DOCUMENTS TO BE PROVIDED BY THE WORLD BANK

1. Updated PIN template, including guidance on city-wide approach.
2. Latest EB guidance on POAs.
3. Financial analysis template.

Annex B

List of consulted Documents

List of Consulted Documents

- 1- Amman Master Development Plan, GAM, 2008.
- 2- Amman Ghabawi Landfill Gas to Energy Project, GAM, Version 3, June 4, 2009.
- 3- Department of Statistics (Jordan), www.dos.gov.jo, 2009.
- 4- Ministry of Energy and Mineral Resources annual report 2008; www.memr.gov.jo
- 5- Ministry of Transport (Jordan) www.mot.gov.jo, 2009
- 6- Electricity Sector in Jordan and Present & Future, National Electric Power Company, April 2009.
- 7- Promotion of a Wind Power Market Project, Project Appraisal Document, World Bank, May 29, 2008.
- 8- Proposal for Implementing Residential and Street Lighting Pilot Project, National Energy Research Center, GAM, June 2008.
- 9- New Slaughterhouse Feasibility Study, Greater Amman, Zarqa, Al Rusaifeh Municipalities, Food Consult AG, March 2009.
- 10-Summary Updated Strategy of Energy Sector in Jordan for the period (2007-2020), December 2007.
- 11-Policies to Reduce Emissions from the Transportation Sector; Pew Center on Global Climate Change, Fall 2008.
- 12-An action Plan for Transport in Amman, Transportation Planning Department , GAM- 2009.

Annex C

List of people met/interviewed

Mission I: period: April 15 to April 21, 2009

Name	Title	Institution
Mr. Ammar Gharaybah	Amman City manager	GAM
Mr. Bashar Haddaden	Director Special Projects & Investments Department	GAM
Eng. Ahmad G. Alhyasat	Project Manager Amman solid Waste Management	GAM
Dr. Ayman Smadi	Transportation and Traffic Management Director	GAM
Eng. Hussein Badarin	Director of Monitoring and Assessment – CDM EB member	Ministry of Environment
Hatem Ababneh	Plant Manager	Jordan Biogas Company Lmt.
Eng. Meqdad Rababaa	Senior technical engineering consultant	GAM
Eng. Mohammad Doroubi	Electrical Engineer	GAM
Eng. Ahmed Ghabashneh	Development Coordinator	GAM

Mission II: July 3rd to July 10th, 2009

Name	Title	Institution
Mr. Bashar Haddaden	Director Special Projects & Investments Department	GAM
Eng. Ahmad G. Alhyasat	Project Manager Amman solid Waste Management	GAM
Dr. Ayman Smadi	Transportation and Traffic Management Director	GAM
Eng. Hussein Badarin	Director of Monitoring and Assessment – CDM EB member	Ministry of Environment
Nisreen Al Anaj	Slaughter house project manager	GAM.
Eng. Lana Al-Zubi	Environment specialist	GAM
Gerry Post	Director	Amman Institute
Daniel Hoornweg	Lead Urban Advisor Sustainable Cities Urban Development	World Bank
Dr. Bassam O.Hayek	Director of Environment Research Centre	Royal Scientific Society RSS
Walid R. Shahin	Head of Rational use of Energy and Solar Thermal division	National Energy Research Center; NERC
Rafat Assi		Environmental Research Centre at RSS
Eng. Faysal Anani	Head of Air Quality Studies Division	RSS
Eng. Saleh Massad	Technical Manager for Planning and Studies	The Jordanian Electric Power Co. ltd. JEPCO
Eng. Anwar A. Ellayan	Head of Planning Department	The Jordanian Electric Power Co. ltd. JEPCO
Eng. Ziad Jibril Sabra	Director of Alternative Energy and Energy efficiency Department	Ministry of Energy and Mineral Resources
Eng. Mahmoud Al-Aes	Director of Planning Department	Ministry of Energy and Mineral Resources
Eng. Marwan Metry Al-Baka'in	Director of Natural Gas Department	Ministry of Energy and Mineral Resources
Eng. Jiries Dababneh	Technical Director	Jordan Water Company Miyahuna
Eng. Mohammed A. Al-Kharabsheh	Head of the Waste Water Treatment Plants Section	Jordan Water Company Miyahuna
Dr. Ahmad Abdel-Fattah		Eco Consult
Eng. Lina Sheqem		Eco Consult

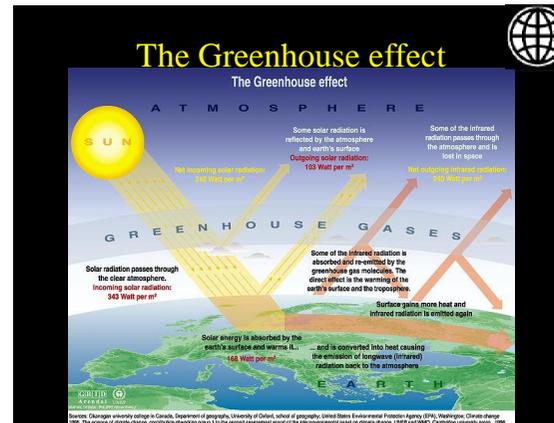
Annex D

Workshop presentations

**Climate Change, The Kyoto Protocol
and Clean Development Mechanism
(CDM)**

**CDM Workshop
Amman, Jordan**

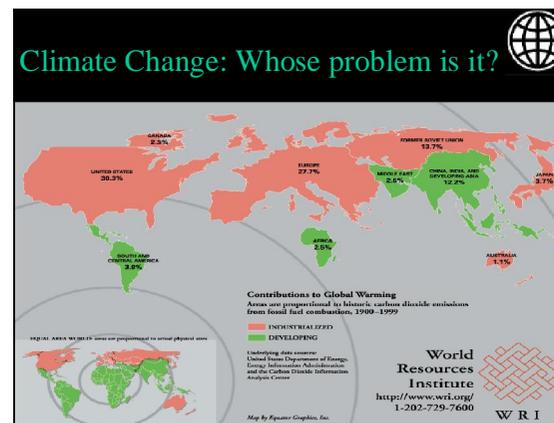
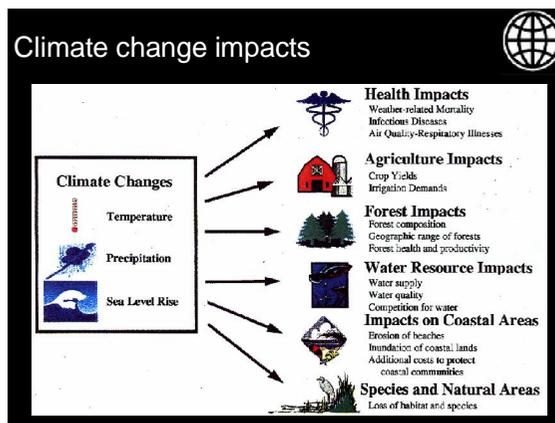
April 21, 2009



IPCC Fourth Assessment Report (2007)

Earth climate is warming and **human activities** are the primary cause (90%)

- CO₂ is the most important anthropogenic greenhouse gas, its global atmospheric concentration has increased from a value of 280 ppm to 379 ppm in 2005.
- 6 GHGs: CO₂, CH₄, N₂O, HFCs, PFCs, SF₆



International response to Climate Change The UNFCCC (RIO Summit 1992)

- Ultimate objective of **stabilizing** global greenhouse gas concentrations in the atmosphere
- Principal of "Common but differentiated responsibilities":
 - Historical emissions of *industrialized countries* and
 - Current global emissions (from industrialized and *developing countries*) cause global warming
- Support **capacity building** in, and facilitate **technology transfer** to developing countries to mitigate, and to adapt to climate change
- Meet as a "Conference of Parties" in the future, **consider progress**

International response to Climate Change The Kyoto Protocol

- 36 Developed Countries and Economies in Transition agreed in 1997 to:
 - ➔ reduce GHG emissions by 5.2 % below 1990 levels in the commitment period 2008-2012
- The PK came into force in February 2005
- 184 states ratified
- US did not ratify yet

Main Greenhouse Gases

The Protocol's emissions targets cover the six main greenhouse gases [Global Warming Potential]:

- Carbon dioxide (CO₂) [1]
- Methane (CH₄) [21]
- Nitrous oxide (N₂O) [310]
- Hydrofluorocarbons (HFCs) [140-11,700]
- Perfluorocarbons (PFCs) [6,500-9,200]
- Sulphur hexafluoride (SF₆) [23,900]

1 ton of CO₂ reduction = 1 ERU or CER
 For example: Reducing 1 ton of CH₄ = Reducing 21 ton of CO₂
 1 ton of CH₄ = 21 ERUs or CERs

How can Developed Countries meet their obligations under Kyoto?

- Domestic Reductions
- International Credits (Kyoto Mechanisms):
 - International Emissions Trading
 - Project –Based: Joint Implementation
 - Project – Based: Clean Development Mechanism

Supplementarity: “..domestic action shall constitute a significant element of the effort by each Party..”

Flexibility Mechanisms of KP

- As it does not matter to the climate where emission reductions are achieved, sound economics argues for achieving them where they are least costly

III- Clean Development Mechanism (CDM)
 Assigns GHG emission targets to Annex I countries between 2008 and 2012

- Annex I
- Non-Annex I

How the CDM works (I)

GHG Reductions

Baseline Emissions

Emission Reductions

Project Emissions

time

How the CDM works (I)

Reduced GHGs in a Non-Annex I country can be sold to an Annex I country

Annex I

Non – Annex I

A CDM project reduces the GHG emissions in the CDM country

Carbon Credits (CERS)

Carbon value (\$)

Buyer

Seller

CDM and its objectives

- More cost-effective emission abatement;
- Contribution to sustainable development in host countries:
 - Environmental (e.g. air quality) and health benefits
 - Access to clean technologies
 - Improved energy efficiency and reduced dependence on imported fuel
 - Infrastructure improvements
 - Increased employment
 - Revenues from credits
 - Mitigation of climate change

Implementing the CDM in host countries

Pre-conditions:

- Ratification of Kyoto Protocol
- Establishment of Designated National Authority (DNA)

A CDM project needs to:

- Be voluntary and approved by involved parties
- Meet national criteria for Sustainable Development (for Letter of Approval)
- Have long-term measurable benefits and emission reductions
- Meet the criteria of the CDM Executive Board
 - Validation, Registration, Monitoring & Verification,...



CDM project cycle steps

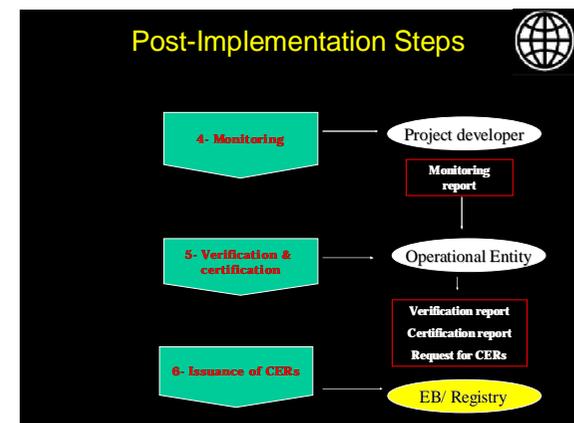
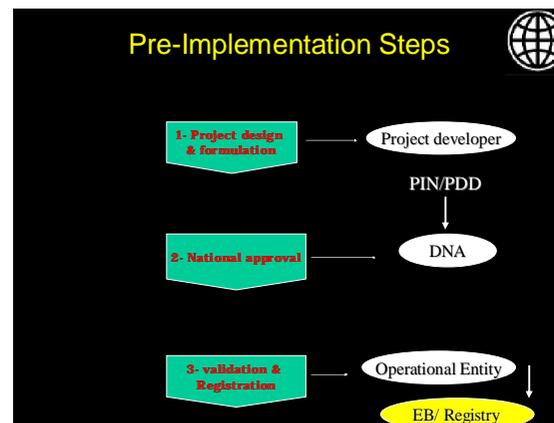
CDM project cycles involves activities split into:

Pre-project implementation actions (one time):

1. Project Design (Project Developer).
2. Project Validation (DOE).
3. Project Registration (EB).

Post-project implementation actions (Repeated):

1. Project Monitoring (Project Developer or Third Party).
2. Verification and Certification (DOE).
3. Issuance (EB).



Prepare a Project Design Document

- ü Baseline Methodology
- ü Duration of the Project Activity
- ü Monitoring Methodology and Plan
- ü Calculation of GHG emissions
- ü Environmental Impacts
- ü Stakeholder Comments

National Approval

- ✓ Screening the projects (in a transparent manner) to assess their effectiveness in meeting SD criteria
- ✓ DNA ⇒ rapid and transparent procedures to evaluate and approve projects

Validation/Registration

- ✓ Review of the project (PDD, feedback from NGOS and local Communities, etc.) by an accredited DOE chosen by the project participants
- ✓ DOE to receive written approval form the DNA of the voluntary participation in the project + Contribution to SD
- ✓ DOE ⇒ forward to the Executive Board for formal registration
- ✓ DOE to make the validation report publicly available

Monitoring

- ü A Monitoring methodology/plan is included in the PDD (transparent, reliable, relevant)
- ü Monitoring : systematic surveillance of the project performance
- ü Monitoring reports (applying the method. above) to be prepared by the project participants : project performance (GHG emission reduction, Leakage)

Verification/Certification

Verification ⇒ Independent process monitoring reports to be submitted to a DOE :

- Periodic auditing of the monitoring results
- Assessment of the emission reductions
- Conformance with monitoring plan
- Conformance of the CERs occurrence with the conditions specified by the validated project
- DOE to forward certification decision to Project participants, Parties involved, EB, and to make the Certification Decision publicly available

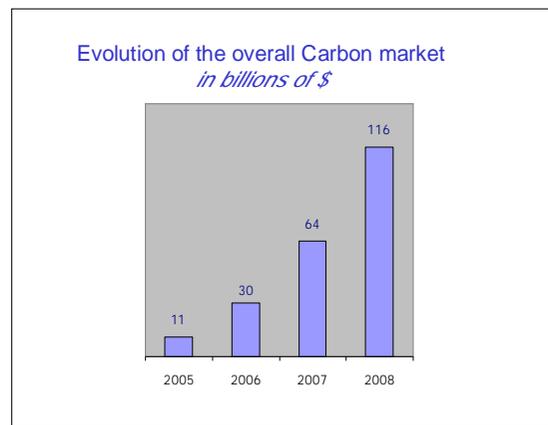
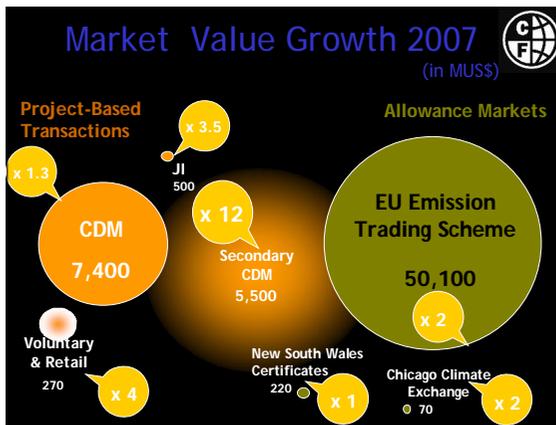
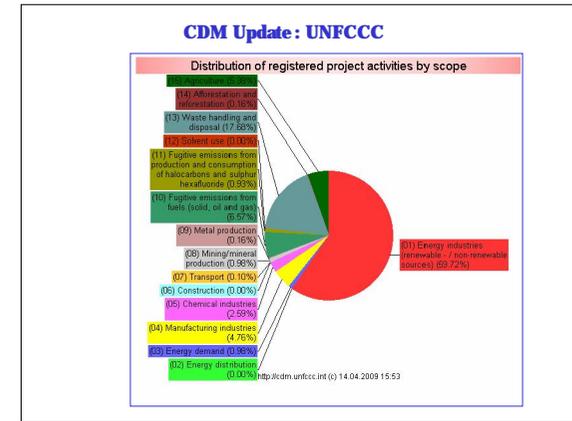
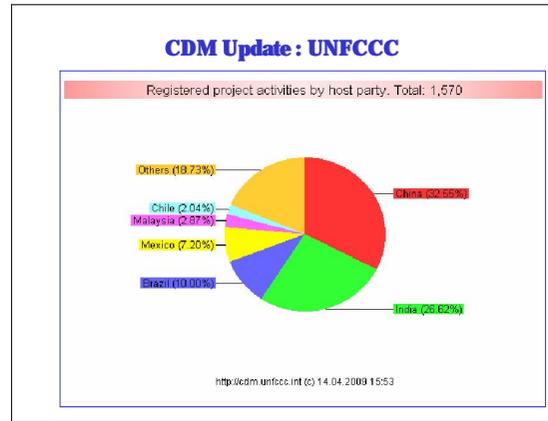
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Issuance of CERs

\$\$\$

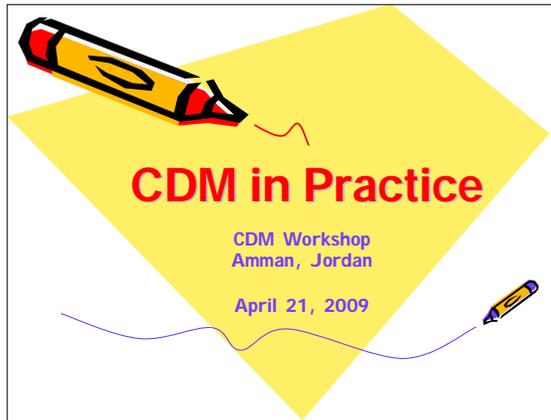


It's a long process
but it works





Thank you
alahbabi@menara.ma



CDM in Practice

CDM Workshop
Amman, Jordan

April 21, 2009

Benefits of CDM

- a) CDM: a mechanism to monetize environmental benefits of clean technologies and processes.
- b) CDM thus provides additional revenues to clean projects.
- c) In addition, CDM registration often helps with financing. A project is more attractive to equity and debt investors with CDM status.



Requirements for CDM

- ü GHG emission reductions in real and measurable manner
- ü Contribution to the sustainable development of the host country
- ü Additionality: the project proponent should demonstrate that the project cannot be implemented without the CDM status and revenues. Otherwise the project will be part of the Business-As-Usual: BAU scenario
- ü The project should be developed according to the methodologies and procedures approved by the CDM EB.



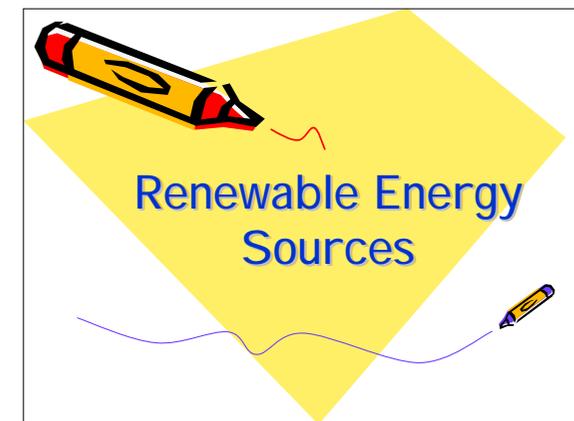
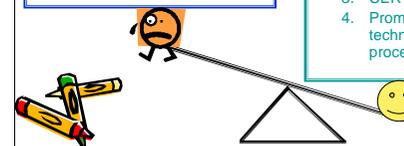
Types of CDM Projects

- ü Renewable Energy Projects
- ü Energy Efficiency Improvement Projects
- ü Other Project Activities
 - Agriculture
 - Switching fossil fuels
 - Emission reductions by low-greenhouse gas emitting vehicles
 - Methane recovery
 - Methane avoidance
 - Land Use and Land Use Change, Forestry (LULUCF), etc.



Costs and Benefits

Costs	Benefits
<ol style="list-style-type: none">1. Additional costs for the implementation2. Fees for, professional and registration etc3. Timely process4. Risks	<ol style="list-style-type: none">1. Fight against the global warming2. Preserving natural resources3. CER revenue4. Promote clean technologies and processes



Renewable Energy Sources

What is renewable energy?

- ü **Renewable energy:** Energy derived from sources that are regenerative or for all practical purposes can not be depleted.
- ü **Project type:** Construction of new or rehabilitation of existing RE based power generation units.
- ü **Examples:**
 - Solar Energy
 - Wind Energy
 - Hydro Energy
 - Geothermal
 - Biomass

6

Renewable energy projects under the CDM

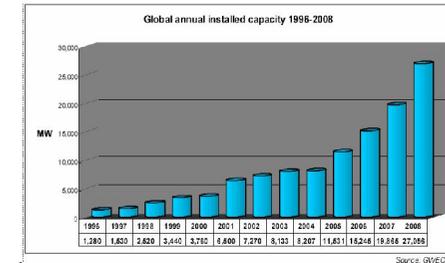
ü WHY?

By generating thermal or electric energy with renewable sources we reduce the GHG emissions associated with fossil fuels combustion for energy generation.

- ü Example: Replacing a 15 MW coal fired TPP that emitted 98,000 tCO₂/year and by a new Wind Farm, will reduce the GHG emissions by 98,000 tCO₂

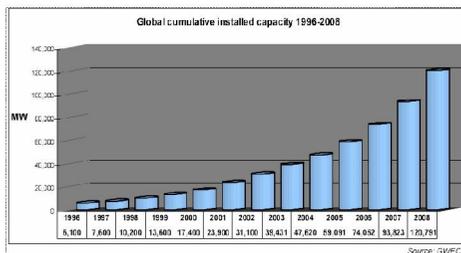
7

Wind Power



8

Wind Power



9

Example

Project: Zafarana Wind Farm (Egypt)

Description: Construction of 120 MW wind farm

Annual generation: 452 016 MWh/yr

Methodology: ACM-0002.

Expected CER: 248 016 tCO₂ / Year

Registered June 22, 2007 under N° 0740

10

Fuel switch and
Cogeneration

Fuel Switch and Cogeneration

- Fuel switch** : Switching from intensive fossil fuels (coal or heavy fuel oil) to less intensive fossil fuels (Natural gas, LPG).
Emission reductions achieved as a result of the decreased carbon intensity of electricity and/or heat generation.
- Cogeneration** : Switch from electricity generation only to electricity and heat generation. High energy efficiency with less GHG emissions per unit energy generated



12

EXAMPLE

Fuel Switching Project of the Aqaba Thermal Power Station ATPS: from fuel oil to natural gas;

Methodology ACM 0011 – “Consolidated baseline methodology for fuel switching from coal and/or petroleum fuels to natural gas in existing power plants for electricity generation”

Expected CER: 397 163 tCO₂/ Year

Registered on September 30, 2008 under N° 1758



13

LANDFILL GAS CAPTURE, FLARING OR USE



LandFill Gas (LFG)

- ü Landfill gas (LFG) is generated as a result of microbial processes.
- ü LFG production depends on the volume and type of waste (particularly its organic content) and landfill conditions (especially moisture).
- ü It is mixture of methane and carbon dioxide and volatile organic compounds.

CDM Category

- ü This project category comprises measures to capture and combust methane from landfills used for disposal of residues from human activities including municipal, industrial, and other solid wastes containing biodegradable organic matter.
- ü the recovered LFG could be flared or used for heat or electricity generation.

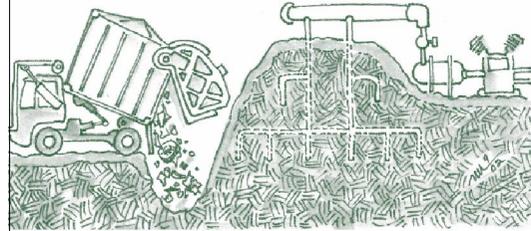
REDUCTION OF THE GHG

Based on the fact methane is a potent greenhouse gas, 21 times stronger than carbon dioxide.

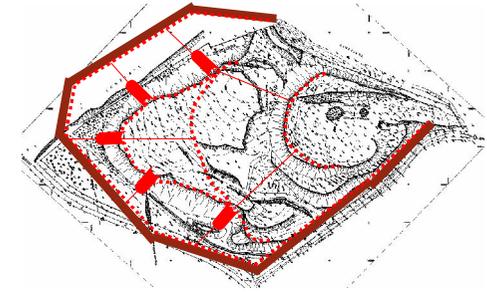
ADDITIONALITY

Voluntary project implementation for the CDM, no local legal obligation to flare LFG

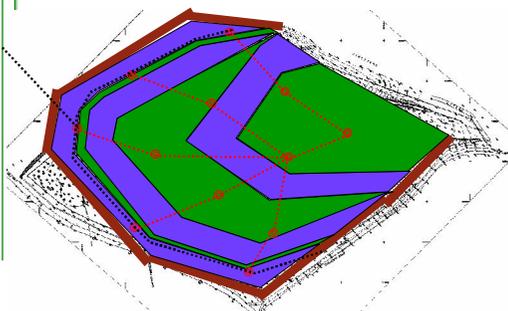
PUMP THE DUMP



Leachate water collecting system



Gas collecting System



Gas Flaring



Approved Methodologies for waste projects

1. AM : Approved Methodology" [large scale]
AM0002, AM0003, AM0010, AM0011, AM0013, AM0022, AM0025, AM0039, AM0057
2. AMS: Approved Methodology for Small-scale CDM projects
AMSIII.E, III.F, III.G, III.H , III.I III.L
3. ACM : Approved Consolidated Methodology [large scale]
ACM0001, ACM0010

EXAMPLE

Description: Biogas capture, flaring or use in 14 main landfills in Morocco

Methodology: Programmatic approach based on ACM 0001 – “Consolidated baseline and monitoring methodology for landfill gas project activities”

Expected CER: 26 M tCO₂ over 25 years

Nominal installed capacity: 50 MW

CDM Program under development

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Energy Efficiency

Energy Efficiency

- Energy Efficiency comprises all the technologies, processes and measures that reduce the energy consumption required to produce one unit of goods or to deliver a specified service.
- Thus, for the same production or service offered, less energy is used and the associated GHG emissions are then reduced.

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Efficient Lighting Example

Project: Visakhapatnam (India) OSRAM CFL distribution CDM Project

Description: Replacement of 500 000 incandescent lamps (90% 60 W and 10% 100W) per 15W and 20W Compact Florescent Lamps)

Methodology: AMS-II.C. “Demand-side energy efficiency programs for specific technologies”

Expected CERs: 275 276 tCO₂ over 10 years

Registered February 12, 2009 under N° 1754

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Transport Systems

Transport Systems under the CDM

- ü Transport projects that use less carbon intensive fuels improve the fuel combustion efficiency or save energy through traffic optimization or modal change.
- ü Three approved methodologies
 - AM 0031: Baseline Methodology for Bus Rapid Transit Projects
 - AMS III.C: Emission reductions by low-greenhouse gas emitting vehicles
 - AMS-III.U: Cable Cars for Mass Rapid Transit System (MRTS)
- ü Two new proposed methodologies are under validation : NM0258 (variation of AM0031 and NM0266 for Railway Rapid Transit Projects)

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CDM Transport Projects

Methodology	Registered projects	Projects under validation	Total
AM0031	1	4	5
ASM III C	1	2	3
ASM III U	1		1
Total	3	6	9

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EXAMPLE

Bus Rapid Transit in Bogotá, Colombia TransMilenio Phase II-IV

Additional 1,3 M passengers/day using BRT

Methodology AM 0031: Baseline Methodology for
Bus Rapid Transit Projects

Expected CER: 1,7 M tCO₂ over 7 years

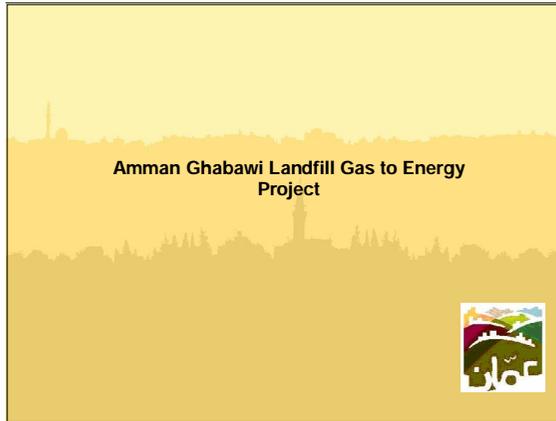
Registered on December 7, 2006 under N° 0672

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Thank you
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Project Activity

The purpose of the project activity is to reduce the greenhouse gas emission from Ghabawi landfill by extraction of the landfill gas (LFG) and utilization of the methane (CH₄) for energy purposes.

Replacing fossil fuel by use of LFG will furthermore reduce the carbon dioxide (CO₂) emission from power stations.

There is no regulatory or legislative requirement for recovering of LFG in Jordan

Municipality of Greater Amman

Project Participants

Name of party involved (host indicate a host Party)	Private and/or public entity(ies) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participants (Yes/No)
Hashemite Kingdom of Jordan (host)	Greater Amman City	No
Government of Luxembourg	International Bank for Reconstruction and Development ("IBRD") acting as the trustee of the Carbon Fund for Europe (CFE)	Yes

Municipality of Greater Amman

Location of Project Activity

Location of the Existing Transfer Stations and the Ghabawi Landfill

Municipality of Greater Amman

Municipality of Greater Amman

Municipality of Greater Amman

Technology of the Project Activity

Completed cell interim covered and restored to the appropriate grades

Capping system

Leachate recirculation system

Vertical extraction wells

Gas pump/compressor and gas treatment system

Enclosed flare units

Gas/engine generator sets

Control, regulation, and monitoring system



Municipality of Greater Amman



Municipality of Greater Amman



Municipality of Greater Amman



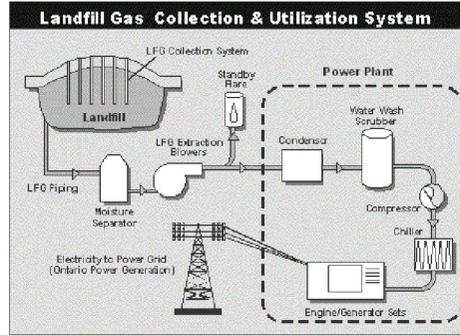
Municipality of Greater Amman



Municipality of Greater Amman



Municipality of Greater Amman

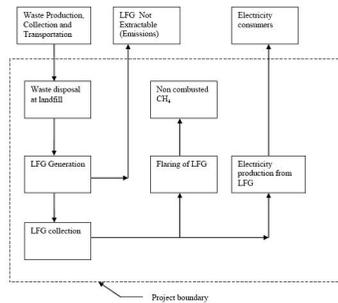


Municipality of Greater Amman



Municipality of Greater Amman

Project Boundary Activity



Municipality of Greater Amman

Estimated amount of emission reductions over the chosen crediting period:

Year	Annual estimation of emission reduction in tonnes of CO ₂ e
2009	158.545
2010	175.376
2011	200.512
2012	216.258
2013	240.871
2014	256.397
2015	272.004
Total estimated CO₂e reductions over the first crediting period (tonnes of CO₂e)	
	1,519,963
Total Number of crediting year over the first crediting period	
	7
reduction over the first crediting period (tonnes of CO₂e)	
	217,138

Municipality of Greater Amman



Thanks

Ahmad G. Alhyasat
 Project Manager – Amman Solid Waste Management