



**PROGRAMME DESIGN DOCUMENT FORM FOR CDM PROGRAMMES OF ACTIVITIES
(F-CDM-PoA-DD)
Version 02.0**

PROGRAMME OF ACTIVITIES DESIGN DOCUMENT (PoA-DD)

PART I. Programme of activities (PoA)

SECTION A. General description of PoA

A.1. Title of the PoA

PoA Solar PV in Pakistan

Version 03

Date: 05/12/2012

A.2. Purpose and general description of the PoA

The purpose of the proposed Program of Activities (PoA) is to develop a series of Photovoltaic solar power plants in different regions of Pakistan.

A typical CPA will consist on the installation of one single PV Solar Power Plant and it will be developed as an independent power project. Each one of the CPA's will be autonomous and several project developers could develop the different CPA's.

1. General operating and implementing framework of PoA

Energy sector institutions:

Since its independence, Pakistan has been working constantly on the development of its electric power sector. In 1959, soon after the creation of the Water and Power Development Authority (**WAPDA**), the total installed capacity was 119 MW for the entire country. By the year 1965, the total installed capacity of the country rose to 653 MW with many hydroelectric projects, producing around 2.5 GWh per year. During the following decades, the developing pace of the electric sector gain some speed, reaching the 1,331 MW of installed capacity in 1970 with the addition of new thermal and hydroelectric power plants. In the early 1980's, the installed capacity of the electric system touched the 3,000 MW and within the following then years it touched the 7,000 MW. Today the total installed capacity in Pakistan is over 18,100 MW.

Over the past 15 years, Pakistan has been following a strategy of deregulation, privatization and transformation of its public sector entities (**PSEs**), including its two major power utilities – WAPDA and Karachi Electric Supply Corporation (**KESC**). WAPDA was established in 1958 as a semi-autonomous agency to coordinate the development of the Water and Power Sectors, which were previously managed by the respective Province Electricity and Irrigation Department.

Since October 2007, WAPDA has been bifurcated into two distinct entities: WAPDA and Pakistan Electric Power Company (**PEPCO**). WAPDA is responsible for water and hydropower development whereas PEPCO is vested with the responsibility of thermal power generation, transmission, distribution and billing. There is an independent Chairman and MD for PEPCO, replacing Chairman WAPDA.



WAPDA is now fully responsible for the development of Hydel Power and Water Sector Projects. PEPCO has been fully empowered and is responsible of the relationship with the different Distribution Companies (**DISCOs**), Generation Companies (**GENCOs**) and the National Transmission Dispatch Company (**NTDC**). These companies are working under independent Board of Directors (Chairman and some Directors are from Private Sectors). The Companies are managed as autonomous entities.

In 1992 the Government approved WAPDA's Strategic Plan for the Privatization of the Pakistan Power Sector. This Plan sought to meet three critical goals:

1. Enhance capital formation,
2. Improve efficiency and rationalize prices, and
3. Provide the greatest chances of expand the role of the private participation in the power sector.

This major decision was taken to improve the viability of Pakistan's electric power sector, which was characterized by extensive government involvement in management, political interference, and a tariff plagued by cross-subsidies. A critical element of the Strategic Plan was the creation and establishment of a Regulatory Authority to oversee the restructuring process and to regulate monopolistic services. The existence of an independent and objective regulatory entity reduced the risk perception to investors in the energetic market. All CPA's included in the proposed PoA will have to request authorization and licences to the Alternative Energy Development Board, which is the regulatory entity that represents the government of Pakistan for renewable energy projects.

Legal background:

As the availability of adequate supplies of energy is a pre-requisite to generate economic activities, the energy sector plays a vital role in ensuring all-round development and growth of economy of a nation. Energy is considered as one of the four major drivers of growth in strategic planning of Pakistan Government (FD, 2001). The other three drivers are agriculture, small & medium enterprises, and information technology. Since the inception of Pakistan, the primary power supplies from the conventional energy sources were (and are still today) not enough to meet the country's demand. Pakistan, despite the enormous potential of its indigenous energy resources, remains energy deficient and has to rely heavily on the imports of the petroleum products to satisfy its present day need. This situation is obligating the industrial sector to face an acute financial crisis on account of their high operating cost. Provision of uninterrupted energy at a competitive rate is vital for making their products more competitive in the domestic as well as foreign markets.

The Ministry of Water and Power has prepared the first ever Renewable Energy Policy of Pakistan, which promotes renewable energy as a fundamental part of the development plans of the country. It groups different incentives to attract local and foreign investment, in order to push Pakistan into the renewable energy map of the world.

Some of the most relevant features of this policy are:

1. It invites investment from the private sector for following categories of proposals:
 - a) Independent power projects, or IPPs (for sale of power to the grid only)
 - b) Captive cum grid spill over power projects. (i.e. for self-use and sale to utility)
 - c) Captive power projects (i.e. for self or dedicated use)
 - d) Isolated grid power projects (i.e. small, stand-alone)

2. Except for Category (a) above, these projects will not require any letter of intention or impact assessment from the Government.
3. It permits an investor to generate renewable electricity at one location and receive an equivalent amount for self-consumption elsewhere in the country, at the investor's own cost of generation plus transmission charges (wheeling).
4. It allows net metering and billing; in other words, a producer can sell surplus of electricity at one time and receive electricity from the grid at another time and settle accounts on net basis. This will directly benefit the economics of small-scale projects, diversify generation and optimize capacity utilization of installed systems.

The proposed PoA will benefit from the policy of the Pakistan government and will fulfil the guidelines and drivers set by the government in the expansion of the renewable energy sector of Pakistan.

2. Policy/measure or stated goal of the PoA

The final goal of the PoA is to supply renewable energy to the Pakistani National Electric Grid, that otherwise, without the PoA, will be supplied with fossil fuel based power plants or other less sustainable technologies.

The proposed PoA will start with one initial activity of 50 MW and is expected to reach a total installed capacity (but not limited) of 2,200 MW of grid connected solar PV power plants in the next eight years.

The locally established Project Owner/Coordinating Managing Entity will employ 95% of the necessary workforce from within Pakistan. This will equate to approximately over 250 permanent management and engineering positions, over 250 permanent administration positions, over 1,000 permanent skilled labour positions and over 3,000 permanent semi-skilled labour positions.

3. Confirmation that the proposed PoA is a voluntary action by the coordinating/managing entity.

The proposed PoA is a voluntary action by the project participants. There are no mandatory laws or regulations in Pakistan that requires the development of photovoltaic power plants.

4. Sustainable Development.

The proposed PoA will have a real contribution to the sustainable development of Pakistan because it will supply clean and renewable electric energy to the National Grid, without harming in any way the ecosystem or depleting the Pakistani natural resources.

For the production of the electricity during the lifetime of the PoA, no other input will be necessary but only the sun radiation. This will reduce substantially the total amount of Greenhouse Gases that are emitted to the atmosphere every year for the generation of electric energy. The proposed PoA will also contribute to the expansion of the Pakistan electric sector into a new less fossil fuel dependable stage.



Also the proposed PoA will contribute with new sources of employment for the construction and operation stages. According to the UNEP Green Jobs Report¹, the average employment generation per installed Solar PV MW, is about 50 different jobs, which about 33 are created for the installation of the facility during the construction stage. This average estimation of employment generation is not following a linear growth in relation with the size of the Solar PV installation, however, based on this information, the CME envisages a total generation of more than 250 permanent positions for the management and engineering tasks, 250 permanent positions for administrative tasks, over 1,000 permanent skilled labour positions and over 3,000 permanent semi-skilled labour positions.² The employment generation will boost the local economies of the regions in which the different CPA's are installed,

A.3. CMEs and participants of PoA

For the proposed PoA the CME will be DACC Power Generation Company (Private) Limited, hereinafter “DPGC”, and will be the entity in charge of all the communication with the Executive Board.

A.4. Party(ies)

Name of Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants(as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Islamic Republic of Pakistan (host country)	DACC Power Generation Company (Private) Limited (Coordinating and Managing entity)	No

A.5. Physical/ Geographical boundary of the PoA

The proposed PoA will have as a geographical boundary the entire territory of the Islamic Republic of Pakistan, however the first CPA will be installed in the Cholistan region.

¹ UNEP, “Green Jobs: Towards decent work in a sustainable, low carbon world”, September 2008, United Nations Environment Program, page 114.

² According the Feasibility Study.

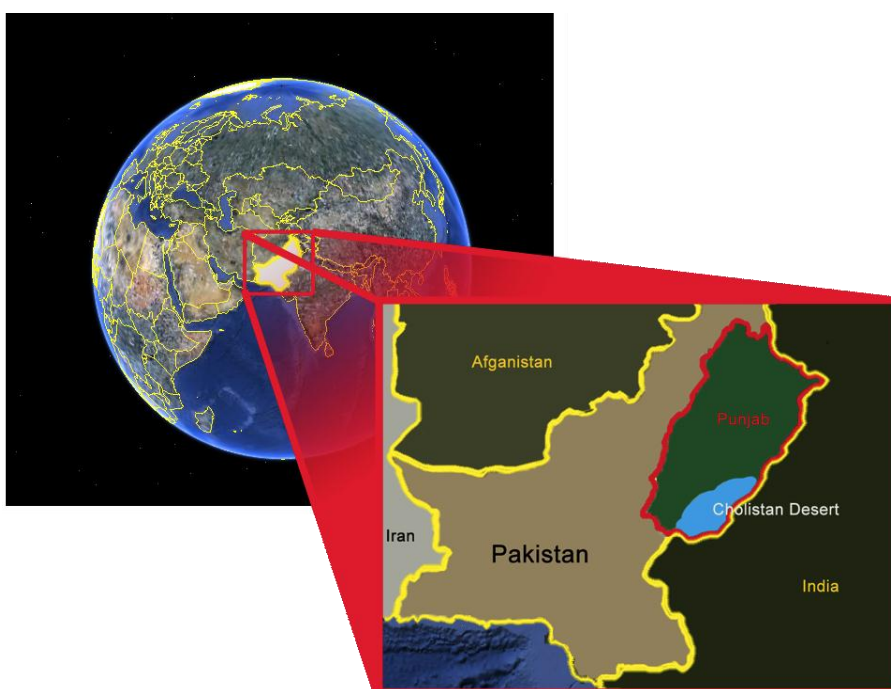


Figure 1: Geographical boundary of the PoA

A.6. Technologies/measures

A typical CPA under the proposed PoA will consist in the installation of a grid connected photovoltaic power plant with a fixed permanent capacity that will most likely oscillate between 50 and 200 MW for each power plant, depending on the conditions of each site, the legal and administrative procedures and the ability to attract the necessary investment.

The technology to be installed in all the CPA's always will be photovoltaic cells combined in PV modules³. These solar plants will use stationary high efficiency solar panels, in order to generate DC (Direct Current) energy, which will then be inverted to AC (Alternating Current) power with specific inverters that will be configured to maximize power generation, reduce power loss and match the national grid specifications.

The solar panels will be placed into elevated racks in order to have a “dual” usage of the land. The dual use application would consist of farming or animal grazing operations under the elevated solar panels. In order to install one MW_{peak} of Solar PV capacity, there is a land requirement between 2 to 3 acres given the current technology. For example, the installation of a solar PV power plant of 50 MW capacity would require a total of 217,392 PV-panels of 230 watts each, for which the required total area of PV-panels would be about a 100 acres⁴.

The schematic and simplified process of photovoltaic power generation is as follows:

³ The purchase contract has not been signed yet, however technical offers have been made by different suppliers detailing the technical aspects of the technology.

⁴ The complete feasibility study will be available for validation purposes.

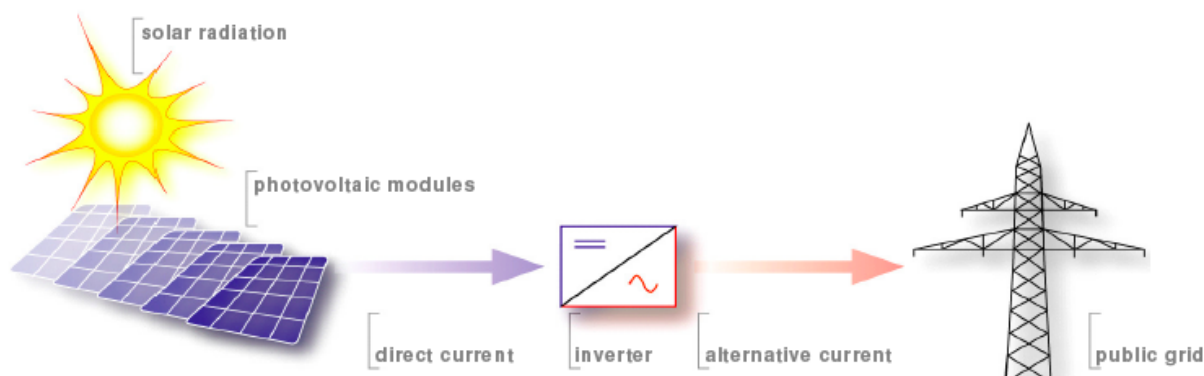


Figure 2: Schematic view of the energy production process

A.7. Public funding of PoA

The proposed PoA will not receive any kind of public funding.

SECTION B. Demonstration of additionality and development of eligibility criteria

B.1. Demonstration of additionality for PoA

- (i) The proposed PoA is a voluntary coordinated action;

The proposed PoA is a voluntary coordinated action. There are no laws or regulations that enforce the implementation of photovoltaic power plants under a PoA scheme. The government of Pakistan is promoting the implementation of new renewable energy projects, however there are no policies that are enforcing any project developer to implement a specific technology. The government strategy is to promote the renewable energy projects throughout a series of incentives, so that the project developer can participate in such projects without absorbing all the risk associated to such new technology and implementing or operating activity. In the absence of the CDM, the proposed PoA and none of its CPA's will occur.

DPGC will be coordinating all the different CPA's that will be part of the PoA; therefore the proposed PoA can be considered as a voluntary and coordinated action.

- (ii) If the PoA is implementing a voluntary coordinated action, it would not be implemented in the absence of the PoA;

As per guidance of the EB 47 report, paragraph 73, the additionality can be demonstrated either on a PoA level or a CPA level. Also the Annex 11 of the EB 51 states that the PoA “*are required to comply with the additionality requirements of the applied methodology*”. For the proposed PoA, all the CPA's will be developed under the same methodology, the ACM0002 (latest available version), however, as the location and dimension of most of the CPA's are not yet known, the additionality will be demonstrated on a CPA level, but complying with additionality inclusion criteria defined at PoA level. This means that every single CPA will have to provide the necessary information for assessing and demonstrating its additionality. For the first CPA, demonstration of the additionality will consist in a barrier analysis as per guidance of the “Tool for the demonstration and assessment of additionality” V.07.0.0.

B.2. Eligibility criteria for inclusion of a CPA in the PoA

The eligibility criteria developed by the CME for the inclusion of new CPA's in the proposed PoA is the following:

1. The geographical boundary of the CPA should be not more than the geographical boundary of the PoA, which is in this case the entire territory of the Islamic Republic of Pakistan.
2. The CPA developer will include in the header of all its official documentation, next to the CPA's name, the following legend: "part of the PoA Solar PV in Pakistan".
3. The CPA consists in the installation of a new Solar PV power plant that will generate electricity that will be delivered to the National Electric Grid.
4. The CPA is a new power generation project as is not part of any other CDM activity or PoA. In order to avoid any double counting, the CPA project owner should provide to the CME a letter stating that the proposed CPA has not been or will not be part of any other PoA activity, has not been or will not be registered as an independent CDM activity and it has not been or will not be registered as an emission reduction activity in any other carbon trading schemes such as (but not limiting to): CDM, Gold Standard, Voluntary Carbon Scheme, etc. The CME will crosscheck the information presented by the CPA PO, performing an independent search of the proposed CPA in the most common carbon schemes.
5. The CPA utilizes the technology described in section A.6, which basically consist in the installation of Photovoltaic Solar Panels for the electricity generation.
6. The CPA project owner is able to demonstrate accurately the starting date of the CPA activity through documentary evidence.
7. The CPA complies with the applicability conditions stated in the ACM0002 V.13.0 (or its latest version).
8. The CPA should adopt the monitoring procedures for accounting the energy delivered to the grid and the emission reductions.
9. The CPA is able to demonstrate and assess its own additionality, by showing supporting evidence. The Additionality will be demonstrated by establishing that in the absence of the CDM the CPA will not occur; for example loan agreement or equity agreement, demonstrating that the carbon credits have been crucial to obtain bank loan and/or equity investors. The additionality will be demonstrated following the step wise approach stated in the "Tool for the demonstration and assessment of additionality" V 07.0.0:
 - Step 0: Demonstration whether the proposed CPA is the "first of its kind".
 - Step 1: Identification of alternatives to the project activity.
 - Step 2: Investment analysis.
 - Step 3: Barrier analysis.
 - Step 4: Common practice analysis.

Furthermore, evidence may be shown to demonstrate the importance of the CDM and PoA inclusion to obtain local approvals (if applicable), or demonstration that the project IRR is below a defined benchmark, which will be defined in line with the requirements of the latest "Guidelines on the assessment of investment analysis". The additionality should be demonstrated according to the latest available version of the "Tool for the demonstration and assessment of additionality".

10. The CPA has performed a Local Stakeholder Consultation and also has presented to the CME an environmental impact assessment or the necessary environmental licenses.
11. The CPA should demonstrate (for example through a signed confirmation letter) that no funding from Annex I country is received, and if so, this finance would not result in a diversion of Official Development Assistance (ODA) funds.
12. The Target group for the CPA is the grid connected power plants by direct installation of a new facility.

13. The CPA PO has signed the “Inclusion Agreement” with the CME.
14. The CPA PO should issue a letter stating that the proposed CPA is a voluntary action.

This criteria has been developed according the “Standard for the development of eligibility criteria for the inclusion of a project activity as a CPA under the PoA”, EB 63, Annex 3.

If the first CPA to be included in the PoA demonstrates its additionality by the “first of its kind” approach, the project will be considered additional without any further analysis.

If required by the eligibility criteria provided above for the inclusion of a proposed CPA in PoA, the Investment Analysis would be conducted as follows:

A suitable and eligible financial indicator (project IRR or equity IRR) would be chosen for the proposed CPA and justification for its selection would be provided. Subsequently, a benchmark would be adopted which is appropriate to the type of financial indicator calculated and could be chosen as either of the following:

Indicator chosen	Benchmark (any one of the following)
Equity IRR	<ol style="list-style-type: none">a. Default value for the expected return on equity for Pakistan as per the “Guidelines on the assessment of investment analysis” (increased by applicable tax rate in case of pre-tax IRR⁵)b. Cost of equity determined using best financial practices (such as Capital Asset Pricing Model) using data sources which can be clearly validated while properly justifying all underlying factors in accordance with the “Guidelines on the assessment of investment analysis”c. Government/official approved benchmark where such benchmarks are used for investment decisions
Project IRR	<ol style="list-style-type: none">a. Local commercial lending rates applicable in the country (pre-tax rate used in case of pre-tax IRR)b. Weighted Average Costs of Capital (WACC) calculated as: $WACC = \{D/(D+E)\} * \{1-T/100\} * \text{Cost of Debt} + \{E/(D+E)\} * \text{Cost of Equity (tax-rate not applied in case of pre-tax IRR)}$ Where, Cost of Debt is determined as local commercial lending rate applicable in the country and Cost of Equity is determined from any of the options listed above under Equity IRR.c. Government/official approved benchmark where such benchmarks are used for investment decisions

Financial indicator calculations will be performed using a financial model based on a list of economic parameters provided by the CPA PO and in accordance with “Guidelines on the assessment of investment analysis”. The list of parameters would include at least the following:

Parameter	Unit	Source/Comment
Technical lifetime	Year	Based on “Tool to determine the remaining lifetime of equipment”: (a) Manufacturer’s information on the technical lifetime of equipment; or (b) Expert evaluation; or

⁵ EB 62, Annex 5, appendix, paragraph 8 of the “Guidelines on the assessment of investment analysis” Version 05 states that the default values for the expected return on equity are calculated after taxes



		(c) Default values
Investment decision date	DD/MM/YYYY	
Construction start date	DD/MM/YYYY	
Date project starts operating	DD/MM/YYYY	
Annual electricity generation of the CPA	MWh/year	As per the “Guidelines for the reporting and validation of plant load factors”: (a) The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval; or (b) The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company)
Electricity tariff	USD/kWh or PKR/kWh	Will be determined on a case-by-case basis in accordance with either of the following (as applicable on the date of investment decision): <ul style="list-style-type: none"> • Power Purchase Agreement • Tariff order of the state electricity regulatory commission • State specific power policy applicable for wind / solar technologies
Escalation in electricity tariff	% per year or USD/kWh/year or PKR/kWh/year	
Exchange rate	Foreign/PKR	If some costs/revenues are provided in foreign currency the exchange rate in public domain as per date of investment decision shall be used to convert to local currency
Cost of Project	USD or PKR	Pre-feasibility assessment report / Detailed Project Report prepared by third party / Quotations from suppliers
Total investment	USD or PKR	If the construction is expected to last several years, a yearly breakdown of investments can be provided
Subsidy	USD or PKR	National or state-specific policy applicable for solar technologies.
Other revenues	USD or PKR	To be included in the calculation only if applicable to CPA and not covered under tariff.
Operation & Maintenance cost (including escalation)	% project cost or USD/ year or PKR/year	Pre-feasibility assessment/ Detailed Project Report prepared by third party / Tariff approval / Technical expert opinion
Insurance	% project cost p.a.	Pre-feasibility assessment report/Detailed Project Report prepared by third party / Quotations from suppliers/ Tariff order of the state electricity regulatory commission / Technical expert opinion
Tax Rate	%	According to applicable legislation.
Depreciation Rate (Based on WDV method for tax calculation)	%	As per local applicable legislation or any other future legislation applicable on the date of investment decision
Depreciation Rate (Based on SLM method for P&L statement)	%	According to applicable legislation.



Percentage of debt sourcing	% of total investment	Pre-feasibility assessment/ Detailed Project Report prepared by third party /typical debt:equity finance structure observed in the power sector of Pakistan /
Interest on term loan	% per annum	Pre-feasibility assessment/ Detailed Project Report prepared by third party / Commercial Lending Rate prevailing at the time of investment decision.
Loan Moratorium	months	Pre-feasibility assessment/ Detailed Project Report prepared by third party / typical loan repayment period observed in the power sector of Pakistan.
Loan Repayment Period	years	Pre-feasibility assessment/ Detailed Project Report prepared by third party / typical loan repayment period observed in the power sector of Pakistan.
Working Capital components	Provision for: <ul style="list-style-type: none"> • Receivables • O&M expenses • Maintenance and spares 	Pre-feasibility assessment/ Detailed Project Report prepared by third party.
Working Capital Interest rate	% per annum	Pre-feasibility assessment/ Detailed Project Report prepared by third party / Commercial Lending Rate prevailing at the time of investment decision.
Salvage value	% of project cost	Pre-feasibility assessment/ Detailed Project Report prepared by third party.

The financial indicator should be lower than the benchmark to demonstrate additionality.

The financial indicator would also require to be subjected to a sensitivity analysis ($\pm 10\%$) by varying critical parameters in the financial model to assess the robustness of the result. The following parameters need to be subjected to the sensitivity analysis:

- Energy generation / Sales income
- Capital Cost
- Operation & Maintenance cost
- Tariff rate

In case the financial indicator is lower than the benchmark even with favourable variations of the key indicators previously described, it can be concluded that the CPA is unlikely to be financially attractive and would not have been implemented without CDM revenues.

If the CPA PO uses a Barrier Analysis in order to demonstrate the additionality of the CPA, the latest approved version of the “Guidelines for objective demonstration and assessment of barriers should be followed. The CPA should demonstrate that the project activity is facing barriers that:

- Prevent the implementation of the CPA
- Do not prevent the implementation of at least one of the alternatives described in the Step 1.

If the CDM does not alleviate the identified barriers that prevent the implementation of the proposed CPA, the project cannot be considered additional.

After the barrier or financial analysis, a common practice analysis should be performed, in order to determine the extent to which the proposed CPA has already diffused in the relevant sector and region. If the outcome of the common practice analysis is that the project is not the common practice in the region, and the CPA has successfully demonstrated its additionality by either the barrier or financial analysis, it will be concluded that the CPA is additional.

The following flow diagram has been developed for illustrating the CPA inclusion process that will be followed for the addition of new CPA's to the proposed PoA.

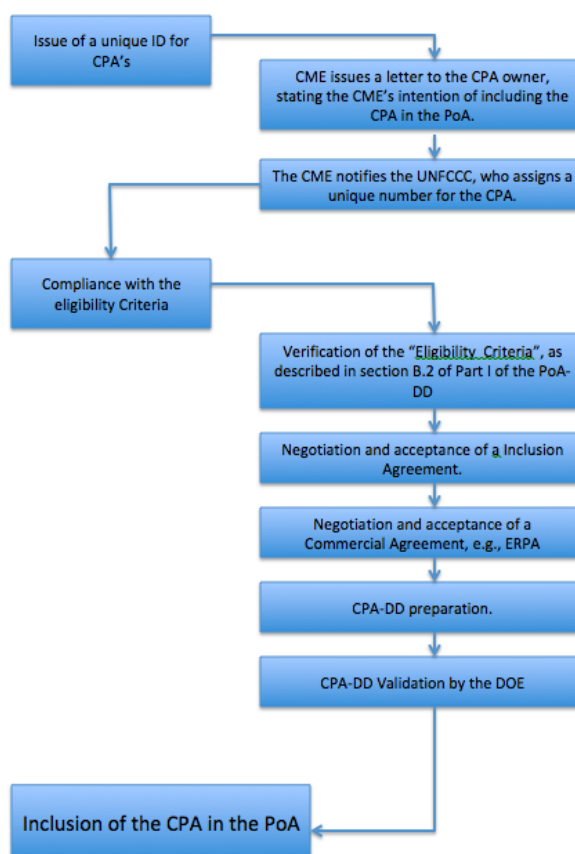


Figure 3: CPA inclusion process

It is important to mention that for issuing the unique ID for each new CPA, the CME will follow the “PROCEDURE FOR ISSUE OF UNIQUE ID FOR CPAs AND UPDATING OF CPA LIST” of the Pakistan Solar PV PoA CME Operational Manual; the same case will be for the “PROCEDURE FOR CHECKING THE ELIGIBILITY CRITERIA FOR CPA's AND INCLUSION IN THE PoA”.

B.3. Application of methodologies

All the CPA's to be included in the proposed PoA will be developed under the methodology ACM0002 V.13.0.0,(or its latest version) which is applicable to grid-connected renewable power generation project activities that:

- a) Install a new power plant at site, where no renewable power plant was operated prior to the implementation of the Project Activity.
- b) Involve capacity addition.
- c) Involve a retrofit of an existing plant.
- d) Involve replacement of an existing plant.

The CPA's should meet the following condition:

- The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydropower plant/unit, wind power/plant unit, geothermal power/plant unit, solar power plant/unit, wave power/plant unit or tidal power/plant unit.

The CPA's will consist in the installation of photovoltaic solar power plants at a site where hasn't been installed any previous non-renewable nor renewable power generation plant. The solar PV farm moreover is adding capacity to the National Pakistani Grid and hence fulfils the applicability criteria of the ACM0002 V.13.0.0 (or its latest version).

Also the proposed Project Activity doesn't involve switching from fossil fuels to renewable energy sources at the site of the Project Activity, so the base line can be identified as described in section E.4.

All the necessary historical data for making the calculations, as established in the ACM0002 V.13.0.0 (or its latest version) and in the different tools mentioned within the methodology, is publicly available at different government institutes and entities, also the geographic and system boundary can be clearly identified.

In order to illustrate the general procedure of electricity generation, the following diagram is presented:

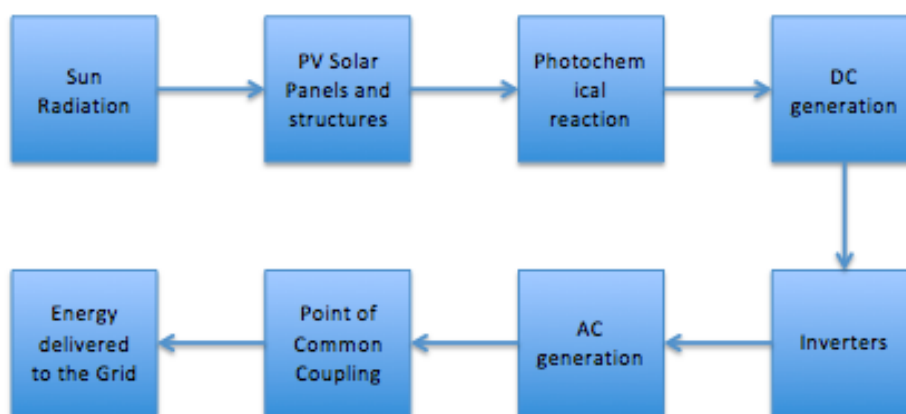


Figure 4: Power Generation Flow diagram

SECTION C. Management system

According to the EB 70 annex 5, paragraph 19, the CME will perform the following tasks:

- Define the roles and responsibilities of personnel involved in the process of inclusion of CPA's including a review of their competences. For the proposed PoA, the CME Operation Manual V 1.2, describes the full procedure for the inclusion of the different CPA's into the PoA. The roles and responsibilities of the different entities throughout the procedure are explained.
- Records of arrangements for training and capacity development for personnel. The CME will hold a database with all the information for the training of all the personnel involved in the management of the PoA and the coordination of the different CPA's.
- Procedures for technical review of inclusion of CPA's. The CME has developed the "CME Operation Manual". The "PROCEDURE FOR CHECKING THE ELIGIBILITY CRITERIA FOR CPA's AND INCLUSION IN THE PoA" is included in the manual.

The coordinating and managing entity DPGC will maintain an electronic database with the following information per CPA subscribing to the PoA. The CME will have all the competencies to check the features of potential CPA's and ensure that each CPA meets all requirements and eligibility criteria before inclusion in the registered PoA.

- Name of the CPA
- Implementing entity of the CPA
- Installed capacity of the CPA
- Location of the CPA

Also DPGC will perform, among others, the following tasks that are necessary for the successful operation of the PoA:

- Ensuring the proper operation of each CPA as stated in the corresponding CPA-DD during the lifetime of the PoA, developing the necessary procedures for the correct inclusion of new CPA's into the PoA.
- Inclusion of new CPA's into the PoA.
- Identification of CPA's.
- Procedures of technical reviews of CPA's.
- Procedures to avoid double counting.
- Records of arrangements for training and capacity development of personnel.
- Investment analysis of new CPA's.
- PoA document control with records and documentation control process for each CPA under the PoA.
- Overall PoA operation.
- Quality control.
- Measures for continuous improvements of the PoA management system.
- Etc.

Along with the above mentioned activities, the CME also will perform ,among others, the following tasks:

- PoA-DD and CPA-DD development.
- Supporting the registration of the PoA.
- Supporting the CER's issuance.
- Supporting the Validation and Verification of the PoA.
- Validation and verification support to CPA implementer throughout the crediting period.
- CPA monitoring training.
- Etc.

The CME will implement a unique identification system in order to have a clear and transparent record of the activities and operation of each one of the CPA's. Because of the nature of the PoA, each CPA will have a robust infrastructure that will facilitate the monitoring and control of the information of each CPA. All the information about the electricity production will be reported to the project participant and will be recorded monthly in order to keep a close track of the overall operation of the PoA. Each one of the CPA's will carry out periodic (monthly) analysis of the information that is recording and supplying to the project participant. In a discrepancy is found between the information of the CPA developer and the information of the project participant, corrective actions will be taken.

In order to avoid double accounting of the emission reductions of the CPA's and to ensure that each CPA is being part of one and only one PoA, a contractual arrangement will be celebrated for each CPA, stating the following:

1. The CPA has not been and will not be registered as an independent CDM activity, nor as a CPA under another PoA.

2. The CPA implementing entity is aware that the CPA will be subscribed to the present PoA.
3. The CPA implementing entity is transferring the right and responsibility of claiming the emission reductions certificates of the CDM or any other voluntary scheme, to the project developer of the PoA.

It is important to mention that the CME will have all the competences to check the features of potential CPA's and ensure that each CPA meets all requirements and eligibility criteria before inclusion in the registered PoA.

SECTION D. Duration of PoA

D.1. Start date of PoA

According to the CDM Glossary of Terms V 7.0, the start date, in the context of the PoA, is defined as the date on which the CME officially notifies the secretariat and the DNA of their intention to seek the CDM status or the date of publication of the PoA – DD for the global stakeholder consultation. Therefore the starting date of the proposed PoA will be:

01/08/2012, publication of the PoA for the global stakeholder consultation⁶.

D.2. Length of the PoA

28 years counting from the start of the PoA. The PoA will be renewed every 7 years counting from the date of its registration as per paragraph 163, EB70 annex 2 (Clean development mechanism project standard, version 02.1).

SECTION E. Environmental impacts

E.1. Level at which environmental analysis is undertaken

- | | |
|--|-------------------------------------|
| 1. Environmental Analysis is done at PoA level | <input type="checkbox"/> |
| 2. Environmental Analysis is done at CPA level | <input checked="" type="checkbox"/> |

The environmental impact analysis will be performed at a CPA level because most of the locations in which the CPA's will take place are not yet known. The proposed PoA is expected to have a minimum environmental impact because in the long term, there are no emissions of any kind of gas, water discharges, dust and noise generation or any other kind of pollutants or sub-products. The operation of each one of the CPA's is considered a "static" operation because there are no mechanical transformations of energy. The only input is the sun irradiation and the only output is the electricity.

Each one of the CPA's will perform an independent Environmental Impact Assessment in order to have an accurate picture of the impact in the geographical area in which the CPA will be implemented.

E.2. Analysis of the environmental impacts

As mentioned in the previous section, the environmental impacts analysis will be performed by each one of the CPA's, however the general structure of the study will be:

6

<http://cdm.unfccc.int/ProgrammeOfActivities/Validation/DB/UGREN3VN3PONTDMM2ZF29VWTOT0957/view.html>

- Analysis of the construction and operation of the CPA.
- Affectations of:
 - Water
 - Soil
 - Air
 - Flora and Fauna
 - Socio economic aspects.

For the development of each one of the CPA's and according to the Policy for development of renewable energy for power generation 2006, the Alternative Energy Development Board (**AEDB**) representing the Government of Pakistan, requires from the project owner to complete a feasibility study and the milestones listed in the letter of intention⁷. The 3rd milestone of the Letter of Intention requires an Initial Environmental Examination (**IEE**) and a Environmental Impact Assessment (**EIA**). As part of the milestones of the Letter of Intention (**LoI**), both studies should be submitted to the corresponding authority in order to get the necessary authorization for developing the CPA.

E.3. Environmental impact assessment

To be performed on a CPA basis.

SECTION F. Local stakeholder comments

F.1. Solicitation of comments from local stakeholders

On June 26th, 2012, the Local Stakeholder Consultation for the PoA took place in the Serena Hotel of Islamabad. At the same time, the LSC of the first CPA to be included in the PoA took place as well. The reason of having both consultations at the same time was that, because of security reasons, it was not possible to have the LSC of the CPA on the project site. Pakistan has a severe terrorism problem and no national authorities would assist to a consultation that could not offer the minimum security conditions. Therefore, the only possibility of having the consultation was to provide the necessary logistic facilities for the Local Stakeholders to travel to Islamabad and attend the LSC. The project participant provided transportation, accommodation, meals and any other necessary expense to more than 30 community members of the surrounding areas of the CPA project site. It is important to mention that the LSC will be conducted always at a CPA level.

In order to perform the LSC's, the project participant identified and invited the following groups.

GROUP I: NATIONAL LEVEL

- Power Ministry of Water and Power
- Alternative Energy Development Board
- Ministry of Finance
- National Transmission And Dispatch Company Limited
- Etc.

The entities identified in the Group I were invited via invitation letter⁸, mailing and/or telephonic invitation to the programmed Project Activity presentation to explain the project activity characteristics and to receive their comments.

⁷ The Letter of intention of date: 08/02/2011, is available to DOE for validation purposes.

⁸ A list of invited persons, mailing and invitation letters of the three different groups, are available for the validation process.

GROUP II: REGIONAL OR CORPORATION LEVEL

- Employees of DPGC
- Multan Electric Power Company (MEPCO)
- Islamabad Electric Supply Company
- Independent energy consultants
- Etc.

The entities identified in the Group II were invited via invitation letter, mailing and telephonic invitation to the programmed Project Activity presentation.

GROUP III: LOCAL LEVEL

- Local Neighbors and Residents

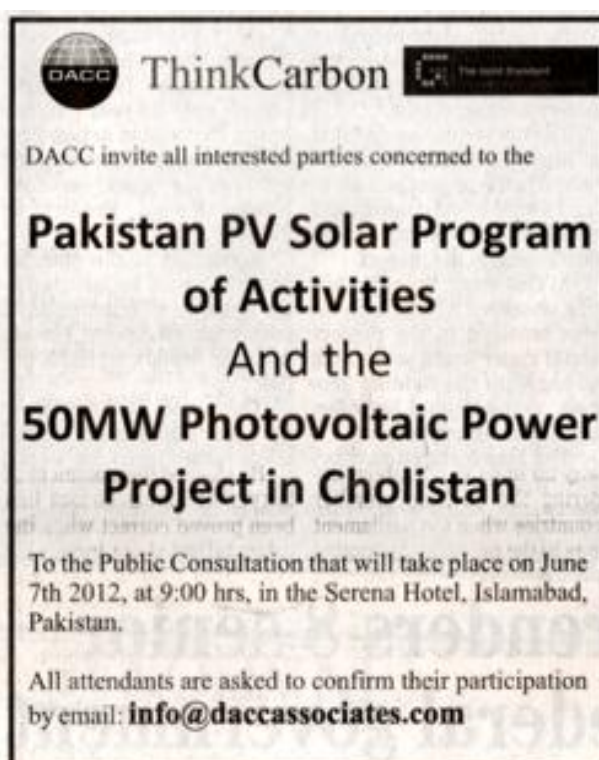
The Group III was invited mainly through the promotion of the LSC on different media and by direct invitation. Also the project participant published an open invitation to the public through an announcement in the local newspaper and also posters were printed and placed in strategic points so the community could be aware of the presentation.

After the presentation to the three identified groups, an opinion poll took place. All the comments received were taken into account and available for the DOE in the validation process.

Also, at the end of the consultation, the participants were asked to answer a brief survey and about the project and the presentation.

For the stakeholders consultation were prepared the following support material

- Power point presentation of the project activity
- Informative leaflets
- Announcements in the Local Newspaper “The News” calling for the stakeholders’ consultation



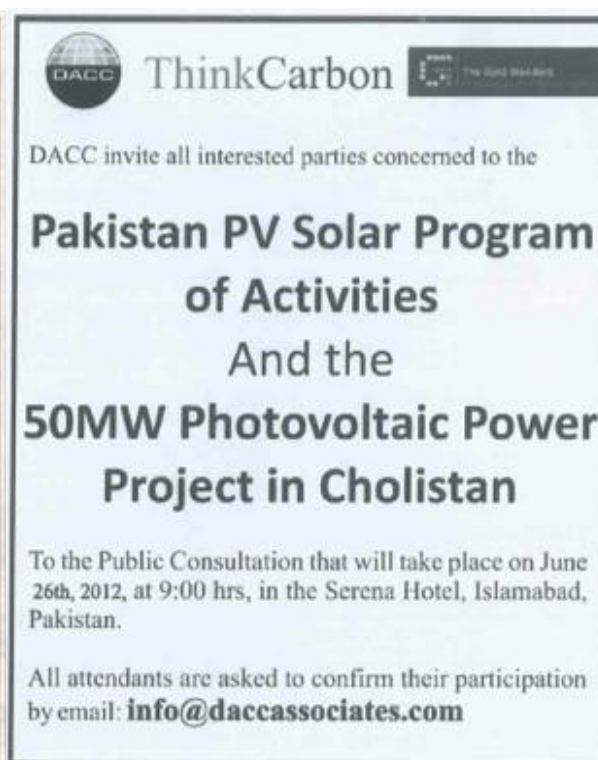
ThinkCarbon The Gold Standard

DACC invite all interested parties concerned to the

**Pakistan PV Solar Program
of Activities
And the
50MW Photovoltaic Power
Project in Cholistan**

To the Public Consultation that will take place on June 7th 2012, at 9:00 hrs, in the Serena Hotel, Islamabad, Pakistan.

All attendants are asked to confirm their participation by email: info@daccassociates.com



ThinkCarbon The Gold Standard

DACC invite all interested parties concerned to the

**Pakistan PV Solar Program
of Activities
And the
50MW Photovoltaic Power
Project in Cholistan**

To the Public Consultation that will take place on June 26th, 2012, at 9:00 hrs, in the Serena Hotel, Islamabad, Pakistan.

All attendants are asked to confirm their participation by email: info@daccassociates.com

Figure 5: Newspaper's advertisement

It is important to mention that the consultation originally was planned to be on June the 7th, however because of logistic problems (the visas for the consultants were not issued by the Pakistani government on time), it was delayed until June 26th. All the stakeholders were informed about the change of the date for the LSC. They were directly contacted by phone and email, confirming their knowledge of the change and also the new date. On June 22nd, 2012, a new newspaper advertisement was published in the “The News International” newspaper, which has a national coverage. The posters displayed had the date, time and location written by hand in order to avoid any misunderstanding with the stakeholders.

**Invites you to the
PUBLIC CONSULTATION
Of the**

**Pakistan Solar Photovoltaic “Program of Activities”
and 50 MW Photovoltaic Power
Project in Cholistan**

Objective of the Project:
The company DPGC has developed a Clean Development Mechanism (CDM) Project that comprises installation of a solar photovoltaic project with the purpose of generating clean, renewable and low cost electricity to be supplied to the national grid of Pakistan. The aim of the project is to install a total capacity of up to about 2,200 MW. In order to complete this amount of installed capacity, DPGC has developed a Program of Activities (PoA) that will consist in the installation of different sub-projects around the country. The first sub-project to be developed is a 50 MW power plant in the Cholistan desert, located in the southern area of Punjab

The process:
For the generation of electricity, the project will take advantage of solar radiation through the installation of several supporting structures; each one of the structures will hold a defined number of solar panels that are interconnected. In the presence of the sun radiation, the panels generate a photochemical reaction that converts the sun radiation into electric energy. Then, the interconnected panels conduct the electricity into the transmission lines to finally be delivered into the National Grid.

Project Benefits:
This project ensures the generation of sustainable and stable power for the region, taking advantage of renewable natural energy resources and ensuring a production of electricity, which is completely independent of fluctuations in energy and fossil fuel prices worldwide.
The PV Program of Activities marks a precedent in the development of renewable energy projects in Pakistan and in the world, being one of the most ambitious developments ever planned. The project will introduce new sources of investment in the country, new sources of employment, technology transfer and knowledge. The development of each one of the CPA's will open new jobs opportunities, generating an additional income to the local communities around the CPA's sites.

Venue
The consultation will take place in the
Serena Hotel, Islamabad
We will really appreciate if you could
confirm your attendance by email to DPGC

Country Director
Zafar Ahmed
zafar@fco.gov.pk

AGENDA	
09:00 hrs	Welcome
09:15 hrs	Clean Development Mechanism and Gold Standard explanation
09:30 hrs	General characteristics of the Program of Activities and the first CDM Program Activity: Social components Environmental components Socio-economic components Technical components
09:50 hrs	Questions and Answers
11:00 hrs	Break
11:15 hrs	Sustainable Development discussion • Sustainable Development Matrix
12:00 hrs	Results analysis
13:00 hrs	Questions and answers / final comments
13:30 hrs	LSC presentation
14:00 hrs	Lunch

Figure 6: Poster

Green House Effect

The radiation emitted by the Sun, gets to the Earth's surface after going through several layers of the atmosphere.

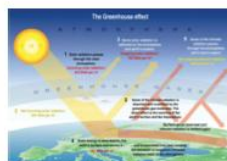
The Earth's crust absorbs the radiation and transforms it in heat, generating the necessary thermal conditions for the existence of life. When the concentration in the atmosphere of CO₂ and other Green House Gases (GHG) increase, the heat generated by the earth's crust cannot be dissipated quickly enough, generating a temperature increase. This effect is known as the Green House Effect and it is the principal cause of Global Warming.





The conventional production of electric energy, the decomposition of organic waste, etc., generates a huge amount of CO₂ and other GHG's.



DACC Power Generation Company
(Private) Limited
House No. 2-B, Street No.14,
Sector F-8/3, Islamabad - Pakistan

thinkcarbon
Oldeslootstr. Str. 2
26389 Wilhelmshaven
Germany
info@german-protec.com




 Public Consultation
Pakistan
Solar Photovoltaic
"Program of Activities"
and 50 MW Photovoltaic
Power Project in
CHOLISTAN

 In collaboration with:
 

Objective	The Process	Benefits
<p>The company DPGC has developed a Clean Development Mechanism (CDM) Project that comprises installation of a solar photovoltaic project with the purpose of generating clean, renewable and low cost electricity to be supplied to the national grid of Pakistan. The aim of the project is to install a total capacity of up to about 2,200 MW. In order to complete this amount of installed capacity, DPGC has developed a Program of Activities (PoA) that will consist in the installation of different sub-projects around the country. The first sub-project to be developed is a 50 MW power plant in the Cholistan desert, located in the southern area of Punjab.</p> <p>One of the main purposes of the project is to avoid the emission of a large amount of CO₂ and GHG's into the atmosphere.</p>	<p>For the generation of electricity, the project will take advantage of solar radiation through the installation of several supporting structures; each one of the structures will hold a defined number of solar panels that are interconnected. In the presence of the sun radiation, the panels generate a photochemical reaction that converts the sun radiation into electric energy. Then, the interconnected panels conduct the electricity into the transmission lines to finally be delivered into the National Grid.</p>	<ul style="list-style-type: none"> Clean Energy Generation Low cost electricity. New employment sources and new investment opportunities. High quality technology transfer. Carbon Credits generation. Emission Reduction of CO₂ and other GHG's. No environmental affectations. <p>Increase of economic activities in the implementation areas.</p>

Figure 7: Leaflet

The PoA / CPA local stakeholder consultation started at 10:00 am in one of the conference rooms of the Serene Hotel in Islamabad. The consultation presentation was performed entirely by Mr. Rodrigo Matabuena of Think Carbon. He began his exposition talking about the purpose of the LSC and its roll in the CDM process and also talking about Climate Change and the importance of the CER's for the project. After that, he began with an explanation about the sustainability aspects that the Gold Standard Certification is requesting, the sustainable development matrix and the blind exercise that moment later, all the audience would have to perform. Informative leaflets were provided to the attendants during the LSC.

Then, after a brief questions and answers break, Mr. Matabuena began with the technical description presentation; he made a brief explanation of the overall mechanism for producing the electric energy and the technical aspects of how it is going to be delivered to the National Grid. Finally the last part of the presentation was about the different environmental, social and economic impacts of the PoA.

After the presentation of the different aspects of the project, a sustainable development matrix exercise was performed. It consisted in dividing the audience into several groups and each one of the groups

would have to evaluate the different aspects of the sustainable development that are considered according to the Gold Standard procedures. These parameters evaluated were:

- Air quality
- Water quality and quantity
- Soil condition
- Other pollutants
- Biodiversity
- Employment quality
- Livelihood for the poor
- Access to clean and affordable energetic services.
- Human and Institutional capacity.
- Quantitative generation of employment and income.
- Payment and investment balance.
- Transfer and self-sufficiency of technology.

Each one of the indicators were explained in order to provide the audience the necessary information for them to decide if the project will have a “positive”, “negative” or “neutral” impact on each one of those indicators.

After finishing the evaluation, a general discussion took place in order to compare the different answers and perceptions of the groups. After reaching a consensus of all the different opinions, the following Consolidated Development Matrix was created.

F.2. Summary of comments received

After the PoA presentation, all the attendants were asked to answer a brief feedback form about the content of the presentation and the objectives of the PoA. The questions of the form were the following:

1. What was your impression about the consultation?
2. What is what you liked the most about the project activity?
3. What is what you don't like about the project activity?
4. In your opinion, what are the social benefits of the project?
5. In your opinion, what are the environmental benefits of the project?
6. In your opinion, what are the economic benefits of the project?
7. In your opinion, what are the social disadvantages of the project?
8. In your opinion, what are the environmental disadvantages of the project?
9. In your opinion, what are the economic disadvantages of the project?
10. General comments

Compilation of the results expressed in the feedback forms:

The feedback forms were filled out at the end of the consultation, before the closure. After reviewing the completed forms, we obtained the following results:

All of the participants indicated that the LSC was very interesting and positive, and some indicated that they were happy to see that the meeting included a very complete representation of stakeholders. They mentioned that the information provided was sufficient and clear. Some comments were made regarding the logistic facilities for transporting people from Cholistan and for translating the content of the meeting.

In terms of what they liked most about the project, some said that they liked everything about the project, others referred to the technology, and others said they liked the economic opportunities that the project was opening for the region. Regarding the question on what stakeholders did not like about the project, some said that they did not like that the project was not giving electricity for free to the community and that they would like it to be operating as soon as possible. It was clear in the presentation that the purpose

of the project is not to deliver free energy to the National Grid. The project itself is constituted as a business and, as such, it requires revenues in order to be profitable, otherwise the activity could not be performed.

When given the opportunity to describe the advantages of the project, the vast majority responded that the main socioeconomic benefit of the project is the fact that it will generate a number of temporary and permanent jobs, which lead to new sources of income and higher living standards in the community. Also many of the stakeholders mentioned that the project will have a big contribution to the electricity sector in Pakistan and will help to decrease the energy shortages that the country suffers because of the lack of infrastructure. Many of the stakeholders mentioned the reduction of CO₂ emissions as one of the main advantages.

When asked about the disadvantages of the project, many stakeholders said that they did not find anything negative about the project.

F.3. Report on consideration of comments received

During the question and answers session, some questions and comments were made. In the following table is a summary of those comments and the response from the Project Participant.

Stakeholder comment	Was comment taken into account (Yes/ No)?	Explanation (Why? How?)
From the total amount of materials and equipment that will be installed, how much will be locally produced and how much will be imported.	Yes	All the panels will be imported from Europe. The same case with the inverters, which will be manufactured in Germany. However, the rest of the materials to be used for the structures, cables, etc. will be purchased locally.
What will be the total cost of production?	No. The comment was just an informative question.	The total cost of implementation is expected around USD \$190 million.
Who will be financing the project?	Yes	There are two main sources of investment, one from a Swiss financing group and the rest will come from different United States investors.

SECTION G. Approval and authorization

The letter of approval (LoA) from Ministry of Climate Change, Government of Pakistan dated 16/10/2012 has been obtained for this PoA. The same is submitted to DOE for validation.

PART II. Generic component project activity (CPA)**SECTION A. General description of a generic CPA****A.1. Purpose and general description of generic CPAs**

As mentioned before, all the CPA's to be included in the PoA will consist of the same PV technology, with solar cells inserted in high efficiency solar panels, that will be combined in PV modules and will follow the same process for generating DC electric energy, which will then be inverted to AC power. The only thing that will differentiate one to each other will be the location and size of the total CPA power installed capacity. The intention of the PoA is to install a total of (but not limited to) about 2,200 MW of solar PV power plants. The location and extent of each one of the CPA's is not yet known and only, at the time of the registration, one CPA will be included in the PoA.

The technology applied by a generic CPA will be photovoltaic solar energy modules interlinked as a solar power plant. This solar plant will use efficient solar panels, which will generate DC energy that then will be inverted to AC power via inverters, specifically configured for the grid. The specific inverters will be configured to maximize power generation, reduce power loss, and exactly match the locally required grid specifications.

Depending on the project site of each CPA, the land used could be owned by the project owner or rented. Whatever the case, it is intended that the land will have a "dual use" because of the elevation of the panels installed. This means that the land could be used for farming or animal grazing activities, at the time it is used for the electricity generation.

There are no physical risks, mechanical parts movement or noises associated to the operation of the CPA's; it is considered an "static operation", only the photochemical reaction inside of the panels will transform the solar radiation into electricity without the intervention of any other agent.

SECTION B. Application of a baseline and monitoring methodology**B.1. Reference of the approved baseline and monitoring methodology(ies) selected**

The approved baseline and monitoring methodology applied to the PoA is the:

- ACM0002: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", Version 13.0.0, valid from 11/05/2012 onwards, or its latest version⁹ for the inclusion of the subsequent CPA's

Also for the documentation of the Project Activity, the following tools were followed:

- Tool to calculate the emission factor for an electricity system – Version 02.2.1¹⁰
- Tool for the demonstration and assessment of additionality - Version 07.0.0.¹¹

Because the project activity relies on the generation of electricity through the conversion of solar radiation, no associated emissions are generated during the operation, so there will be no leakage emissions considered.

⁹ The latest available version of the methodology can be found in the UNFCCC website:

<http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT>

¹⁰ Valid from September 29th 2011 onwards, EB 63 Annex 19, RFR can be submitted July 22nd 2013

¹¹ Valid from November 23rd 2012 onwards, EB 70 Annex 08

B.2. Application of methodology(ies)

The ACM0002 V.13.0 is applicable to grid-connected renewable power generation project activities under the following conditions:

Condition	Applicability to the proposed PoA
Installation of a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant)	Applicable. The proposed PoA consists in the installation of a series of new Solar PV power plants, where no other type of electric generation facility was installed.
Involve capacity addition	Not applicable. The proposed PoA is not considering any type of capacity addition in any of the CPA's.
Involve a retrofit of an existing plant	Not applicable. The CPA's included in the PoA, consists in the installation of a new Solar PV power plant.
Involve a replacement of an existing plant.	Not applicable. The CPA's included in the PoA, consists in the installation of a new Solar PV power plant.

Also the methodology is applicable under the following conditions:

Condition	Applicability to the proposed CPA
The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types; hydro power plant/unit, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit	Applicable. The proposed PoA consists in the installation of a series of new Solar PV power plants, which is consistent with the conditions of the methodology.
In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects which use Option 2: on page 10 of the methodology to calculate the parameter $EG_{PJ,y}$): the existing plant started commercial operation prior the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity	Not applicable. The CPA's included in the proposed PoA are not considering any type of capacity additions, retrofits or replacements of equipment.

Therefore the generic CPA complies accurately with the applicability conditions described in the ACM0002 V.13.0.0 (or latest version available), as each CPA consist in the installation of a new power plant where no renewable power pant was operated prior to the implementation of the CPA. None of the CPA will consist in a capacity addition, will involve a retrofit or a replacement of an existing plant.

Therefore, the generic CPA is in accordance with the applicability conditions established in the ACM0002 V.13.0.0 (or latest version available).

B.3. Sources and GHGs

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	Source 1	CO ₂	Yes	Main emission source. CO ₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source
Project scenario	Source 1	CO ₂	No	No significant emissions of this GHG are associated with the construction or operation of the proposed PoA. No fossil fuel will be consumed during the generation of electricity.
		CH ₄	No	No significant emissions of this GHG are associated with the construction or operation of the proposed PoA
		N ₂ O	No	No significant emissions of this GHG are associated with the construction or operation of the proposed PoA

In order to clarify the sources of emission reductions and general process of the generic CPA, the following flow diagram is presented:

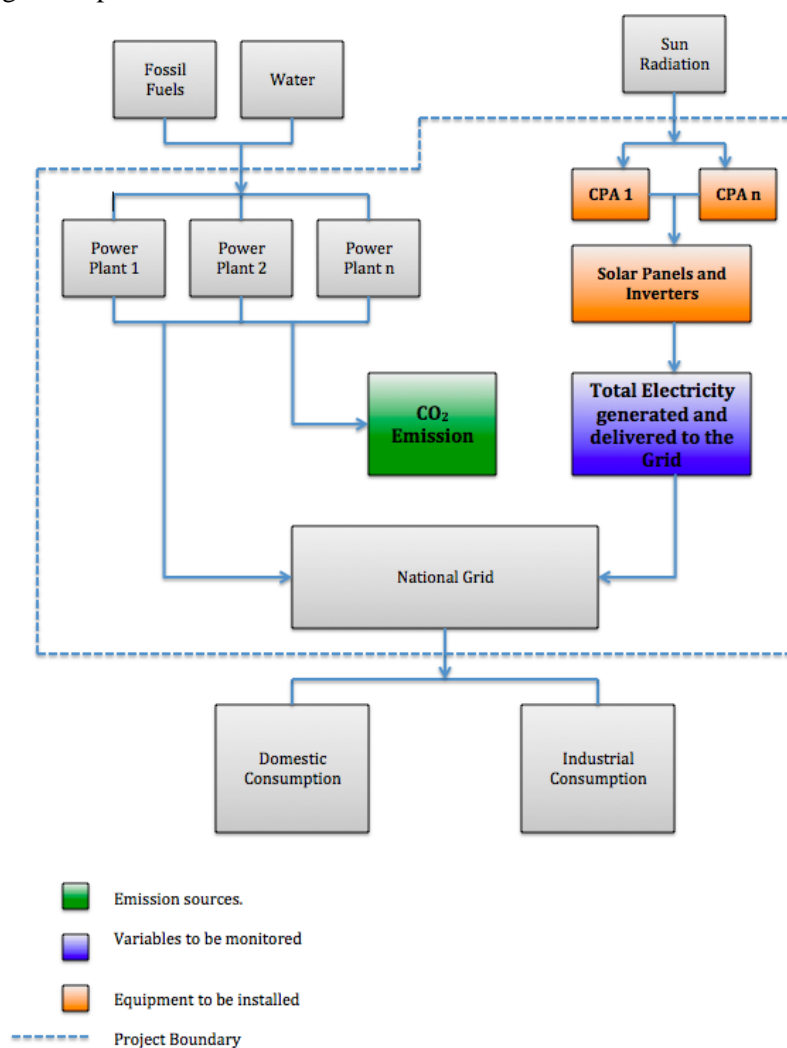


Figure 8: PoA Boundary and GHG emission reductions.

B.4 Description of baseline scenario

The ACM0002 V.13.0.0 states that if the project activity is the installation of a new grid-connected renewable power plant unit, the baseline scenario is the following:

“Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”.

Therefore, the baseline scenario for the CPA’s is defined as the total emissions of GHG generated by the electricity production of the national grid. This is calculated with the amount of electricity generated by each power plants/units connected to the national grid, multiplied by the emission factor of the grid¹².

The total power plants and their contribution to the electric platform during the baseline year 2011 is as follows:

Company	Power Plant	Fuel type	2011 Gross Generation (GWh)	2011 Net Generation (GWh)
Hydel WAPDA	Tarbela	Water	16006.59	15,909.15
	Ghazi Barotha	Water	7434.79	7,354.11
	Mangla	Water	6087.63	5,968.77
	Warsak	Water	1040.45	1,036.26
	Chashma	Water	915.75	915.75
	Malakand	Water	0	0.00
	Dargai	Water	83	82.68
	Rasul	Water	100.99	96.00
	Shadiwal	Water	32.79	30.19
	Chichoki Malian	Water	34.49	33.59
	Nandipur	Water	44.1	43.22
	Kurram Garhi	Water	12.05	9.95
	Renala	Water	2.86	2.82
	Chitral	Water	3.45	3.43
Hydel AJKHEB	Kathai	Water	5.36	5.09
	Kundal_Shahi	Water	0.97	0.92
	Jagran	Water	0	0.00
	Leepa	Water	6.07	5.77
	Kei	Water	0.1	0.10
Thermal WAPDA	GTPS_Shahdra	-	0	0
	SPS_Faisalabad	FO	208.07	208.05
	GTPS_Faisalabad	Gas + HSD	194.3	194.02
	NGPS_Multan	FO	60.85	60.84
	TPS_Muzaffar_Garh	Gas + FO	4107.54	4107.06
	TPS_Guddu (unit 1-4)	Gas + FO	1568.63	1568.5
	TPS_Guddu (unit 5-13)	Gas + FO	4511.57	4511.48
	GTPS_Kotri	Gas	471.7	471.68
	FBC_Lakhra	Coal	88.27	88.25

¹² The emission factor of the national grid is calculated as per guidance of the “Tool to calculate the emission factor for an electric system” V 02.2.1.

	TPS_Jamshoro	Gas + FO	2803.87	2803.56
	TPS_Quetta	Gas	95.91	95.91
	TPS_Pasni	-	0	0
	GTPS_Panjgur	HSD	2.06	2.06
Thermal IPP's	AES_Lalpir	FO	1105.23	1,103.95
	AES_Pak_Gen	FO	1301.41	1,300.40
	Altern_Energy	-	0	0.00
	Attock_Gen	-	0	0.00
	Atlas_Power	FO	1483.76	1,429.01
	Engro_Energy	Gas + HSD	1566.21	1,522.40
	Fauji_Kabirwala	Gas	1119.01	1,088.50
	Foundation_Power	-	0	0.00
	Gul_Ahmed	FO	771.26	749.53
	Habibullah	Gas + HSD	831.21	810.85
	Halmore_Power	-	0	0.00
	HUBCO	FO	8568	8,114.00
	HUB_Power,_Naro wal	-	0	0.00
	Japan_Power	FO + HSD	372.69	355.10
	KAPCO	Gas + FO + HSD	5859.31	5,687.72
	Kohinoor_Energy	FO	915.75	888.29
	Liberty Tech Power	FO	760.62	745.29
	Nishat Chunian	FO	1416.58	1,390.04
	Nishat_Power	-	0	0.00
	Orient_Power	Gas + HSD	1000.68	974.81
	Rousch_Power	Gas + HSD	3039.38	2,985.35
	Saba_Power	FO	262.38	245.34
	Saif_Power	-	0	0.00
	Southern_Electric	FO	482.28	466.68
	Sapphire_Electric	-	0	0.00
	Tapal_Energy	FO + HSD	804.15	793.17
	TNB_Liberty_Powe r	Gas	1333.12	1,329.92
	Uch_Power	Gas + HSD	4221.14	4,203.70
Nuclear	KANUPP	-	221	221.00
	CHASNUPP-I	-	2731	2,731.00
	CHASNUPP-II	-	468	468.00
Imports	Imports	-	269	269.00

Table 1: Total baseline year electricity generation

It is important to mention that the KESC plants are not included in the calculations of the emission factor and the baseline scenario, because the KESC is an independent grid that is supplying energy to the area of Karachi and is not connected to the National Grid.

As per guidance of the “Tool to calculate the emission factor for an electric system” V 02.2.1, the emission factor of the electric grid is defined as the combination of the Operating Margin and the Build Margin. The Operating Margin is the number that reflects the emission factor of the actual installed capacity of the electric grid. The Build Margin is the number that reflects the emission factor of the projection of the additions in the installed capacity of the electric grid. For the proposed project activity, the power plants to be included in the calculation of the Build Margin are as follows:

Name of Power plant	Net Generation (GWh)	Year of commissioning	Technology
Halmore_Power	0	2011	Thermoelectric
CHASNUPP-II	468	2011	Nuclear
Foundation_Power	0	2011	Thermoelectric
HUB_Power, _Narowal	0	2011	Thermoelectric
Liberty Tech Power	760.62	2011	Thermoelectric
Sapphire_Electric	0	2010	Thermoelectric
Nishat Chunian	1416.58	2010	Thermoelectric
Nishat_Power	0	2010	Thermoelectric
Orient_Power	1000.68	2010	Thermoelectric
Saif_Power	0	2010	Thermoelectric
Engro_Energy	1566.21	2010	Thermoelectric
Atlas_Power	1483.76	2009	Thermoelectric
Attock_Gen	0	2009	Thermoelectric
TPS_Quetta	95.91	2005	Thermoelectric
GTPS_Shahdra	0	2005	Thermoelectric
Ghazi Barotha	7434.79	2005	Hydro
TNB_Liberty_Power	1333.12	2001	Thermoelectric
Chashma	915.75	2001	Hydro
Altern_Energy	0	2001	Thermoelectric
Uch_Power	4221.14	2000	Thermoelectric

Table 2: Build margin power plants

B.5 Demonstration of eligibility for a generic CPA

The generic CPA described in section A.1 complies with the eligibility criteria described in section B.2 because of the following:

1. The geographical boundary of all CPA's is within the territory of Pakistan. The generic CPA will provide the detailed coordinates of the power plant.
2. The generic CPA will include in the header of all its official documentation, next to its name, the following legend: "part of the PoA Solar PV in Pakistan"
3. The generic CPA described in section A.1 consists in the installation of a new Solar PV power plant that will generate electricity that will be delivered to the National Electric Grid.
4. The generic CPA consist in the development of a new PV Solar power plant and no retrofits or capacity replacements/additions are considered. The developer of the CPA should demonstrate that the CPA is a new power plant with the purchase contracts of the equipment to be installed. In order to avoid any double counting, the generic CPA project owner will provide to the CME a letter stating that the proposed CPA has not been or will not be part of any other PoA activity, has not been or will not be registered as an independent CDM activity and it has not been or will not be registered as an emission reduction activity in any other carbon trading schemes such as (but not limiting to): CDM, Gold Standard, Voluntary Carbon Scheme, etc. The CME will crosscheck the information presented by the CPA PO, performing an independent search of the proposed CPA in the most common carbon schemes.

5. Although no specific technology supplier has been selected for the CPA's, the technology to be used in the generic CPA will be the same as described in section A.6. The only difference between the different CPA's will be the size (total installed capacity) and the location. The generic CPA will consist in the installation of Photovoltaic Solar Panels for the electricity generation.
6. The CPA owner will be able to demonstrate the starting date of the generic CPA with the purchase contract of the equipment to be installed, as the generic CPA will be a new power plant.
7. As mentioned before, the ACM0002 describes accurately the emission reduction process of the generic CPA and the generic CPA complies with all the applicability conditions stated in the methodology.
8. The generic CPA will use the monitoring procedures developed by the CME as it will have to present a monthly operation report in order to invoice their counterpart, as will be established in each particular PPA.
9. The generic CPA will demonstrate its own additionality according its geographical and infrastructure constrains, by either a financial analysis or a barrier analysis. The generic CPA will demonstrate its own additionality according to the latest available version of the "Tool for the demonstration and assessment of additionality" V 07.0.0 (or its latest version).
10. The generic CPA will perform a local stakeholder consultation under the Gold Standard procedures. Also the generic CPA will present the necessary environmental impact assessment or environmental licenses.
11. The generic CPA will demonstrate (for example through a signed confirmation letter) that no funding from Annex I country is received, and if so, this finance would not result in a diversion of Official Development Assistance (ODA) funds.
12. The target group of the generic CPA is the grid connected power plants by direct installation of a new facility.
13. The generic CPA PO will sign the "Inclusion Agreement" with the CME.
14. The generic CPA PO will issue a letter stating that the proposed CPA is a voluntary action.

In order to demonstrate the additionality of the generic CPA, and if required by the eligibility criteria provided above for the inclusion of a proposed generic CPA in the PoA, the "Tool for the demonstration and assessment of additionality" V 07.0.0 should be followed. The tool establishes the following step wise approach for the additionality demonstration:

Step 0: Demonstration whether the proposed project activity is the first of its kind:

This step is optional and it could only be used with the first proposed CPA. The outcome of the Step 0 is that if the proposed CPA is the first of its kind, its additionality is demonstrated; otherwise the Step 1 should be followed.

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

Credible and realistic alternatives to the CPA should be defined through the following sub-steps:

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

Identify realistic and credible alternative(s) available to the project participants or similar project developers that provide outputs or services comparable with the proposed CDM project activity. These alternatives are to include:

- a) The proposed project activity undertaken without being registered as a CDM project activity;

- b) Other realistic and credible alternative scenario(s) to the proposed CDM project activity scenario that deliver outputs services (e.g. cement) or services (e.g. electricity, heat) with comparable quality, properties and application areas, taking into account, where relevant, examples of scenarios identified in the underlying methodology;
- c) If applicable, continuation of the current situation (no project activity or other alternatives undertaken).

For the purpose of identifying relevant alternative scenarios, the CPA PO will include the technologies or practices that provide outputs or services (e.g. electricity, heat) with comparable quality, properties and application areas as the proposed CPA and that have been implemented previously or are currently being introduced in the relevant country/region.

Sub-step 1b: Consistency with mandatory laws and regulations

The alternative(s) shall be in compliance with all mandatory applicable legal and regulatory requirements, even if these laws and regulations have objectives other than GHG reductions, e.g. to mitigate local air pollution. (This sub-step does not consider national and local policies that do not have legally-binding status.)

Step 2: Investment analysis

The purpose of this step is to determine whether the CPA is not:

- The most economically or financially attractive or
- Economically or financially feasible, without the revenue from the sale of the CER's.

To conduct the analysis, the guidelines proposes the following sub-steps:

Sub-step 2a: Determine appropriate analysis method:

The tool proposes the following options:

- Option I: Simple cost analysis:
 - Document the costs associated with the CPA and the alternatives identified in Step 1 and demonstrate that there is at least one alternative which is less costly than the project activity
- Option II: Investment comparison analysis.
 - Identify the financial indicator, such as IRR, NPV, cost benefit ratio, or unit cost of service (e.g. levelized cost of electricity production in \$/kWh or levelized cost of delivered heat in \$/GJ) most suitable for the project type and decision-making context.
- Option III Benchmark analysis:

For the mentioned options, the following indicators will be used:

Benchmark:

A financial indicator (project IRR or equity IRR) would be chosen for the proposed CPA and justification for its selection would be provided. Subsequently, a benchmark would be adopted which is appropriate to the type of financial indicator calculated and could be chosen as either of the following:

Indicator chosen	Benchmark (any one of the following)
Equity IRR	<ul style="list-style-type: none"> d. Default value for the expected return on equity for Pakistan as per the “Guidelines on the assessment of investment analysis” (increased by applicable tax rate in case of pre-tax IRR¹³) e. Cost of equity determined using best financial practices (such as Capital Asset Pricing Model) using data sources which can be clearly validated while properly justifying all underlying factors in accordance with the “Guidelines on the assessment of investment analysis” f. Government/official approved benchmark where such benchmarks are used for investment decisions
Project IRR	<ul style="list-style-type: none"> c. Local commercial lending rates applicable in the country (pre-tax rate used in case of pre-tax IRR) d. Weighted Average Costs of Capital (WACC) calculated as: $WACC = \{D/(D+E)\} * \{1-T/100\} * \text{Cost of Debt} + \{E/(D+E)\} * \text{Cost of Equity (tax-rate not applied in case of pre-tax IRR)}$ Where, Cost of Debt is determined as local commercial lending rate applicable in the country and Cost of Equity is determined from any of the options listed above under Equity IRR. d. Government/official approved benchmark where such benchmarks are used for investment decisions

Financial Indicator analysis:

Financial indicator calculations will be performed using a financial model based on a list of economic parameters provided by the CPA PO and in accordance with “Guidelines on the assessment of investment analysis”. The list of parameters would include at least the following:

Parameter	Unit	Source/Comment
Technical lifetime	Year	Based on “Tool to determine the remaining lifetime of equipment”: (a) Manufacturer’s information on the technical lifetime of equipment; or (b) Expert evaluation; or (c) Default values
Investment decision date	DD/MM/YYYY	
Construction start date	DD/MM/YYYY	
Date project starts operating	DD/MM/YYYY	
Annual electricity generation of the CPA	MWh/year	As per the “Guidelines for the reporting and validation of plant load factors”: (a) The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval; or

¹³ EB 62, Annex 5, appendix, paragraph 8 of the “Guidelines on the assessment of investment analysis” Version 05 states that the default values for the expected return on equity are calculated after taxes



		(b) The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company)
Electricity tariff	USD/kWh or PKR/kWh	Will be determined on a case-by-case basis in accordance with either of the following (as applicable on the date of investment decision):
Escalation in electricity tariff	% per year or USD/kWh/year or PKR/kWh/year	<ul style="list-style-type: none"> • Power Purchase Agreement • Tariff order of the state electricity regulatory commission • State specific power policy applicable for wind / solar technologies
Exchange rate	Foreign/PKR	If some costs/revenues are provided in foreign currency the exchange rate in public domain as per date of investment decision shall be used to convert to local currency
Cost of Project	USD or PKR	Pre-feasibility assessment report / Detailed Project Report prepared by third party / Quotations from suppliers
Total investment	USD or PKR	If the construction is expected to last several years, a yearly breakdown of investments can be provided
Subsidy	USD or PKR	National or state-specific policy applicable for solar technologies.
Other revenues	USD or PKR	To be included in the calculation only if applicable to CPA and not covered under tariff.
Operation & Maintenance cost (including escalation)	% project cost or USD/year or PKR/ year	Pre-feasibility assessment/ Detailed Project Report prepared by third party / Tariff aproval / Technical expert opinion
Insurance	% project cost p.a.	Pre-feasibility assessment report/Detailed Project Report prepared by third party / Quotations from suppliers/ Tariff order of the state electricity regulatory commission / Technical expert opinion
Tax Rate	%	According to applicable legislation.
Depreciation Rate (Based on WDV method for tax calculation)	%	As per local applicable legislation or any other future legislation applicable on the date of investment decision
Depreciation Rate (Based on SLM method for P&L statement)	%	According to applicable legislation.
Percentage of debt sourcing	% of total investment	Pre-feasibility assessment/ Detailed Project Report prepared by third party /typical debt:equity finance structure observed in the power sector of Pakistan /
Interest on term loan	% per annum	Pre-feasibility assessment/ Detailed Project Report prepared by third party / Commercial Lending Rate prevailing at the time of investment decision.
Loan Moratorium	months	Pre-feasibility assessment/ Detailed Project Report prepared by third party / typical loan repayment period observed in the power sector of Pakistan.
Loan Repayment Period	years	Pre-feasibility assessment/ Detailed Project Report prepared by third party / typical loan repayment period observed in the power sector of Pakistan.
Working Capital	Provision for:	Pre-feasibility assessment/ Detailed Project Report



components	<ul style="list-style-type: none"> • Receivables • O&M expenses • Maintenance and spares 	prepared by third party.
Working Capital Interest rate	% per annum	Pre-feasibility assessment/ Detailed Project Report prepared by third party / Commercial Lending Rate prevailing at the time of investment decision.
Salvage value	% of project cost	Pre-feasibility assessment/ Detailed Project Report prepared by third party.

The “*financial indicator*” for the project activity works out to be “___”%. Hence it can be clearly observed that the returns from the project do not exceed the benchmark of “___”%. Thus the project activity on its own is clearly not a financially viable option and hence the revenue from CDM is essential to make the project activity a financially viable venture.

Sub-step 2d: Sensitivity analysis (only applicable to Options II and III):

Sensitivity analysis:

The financial indicator would also require to be subjected to a sensitivity analysis ($\pm 10\%$) by varying critical parameters in the financial model to assess the robustness of the result. The following parameters need to be subjected to the sensitivity analysis:

- Energy generation / Sales income
- Capital Cost
- Operation & Maintenance cost
- Tariff rate

<i>Variable Parameter</i>	-10%	0%	+10%	Justification
Energy Generation	“ _ ”%	“ _ ”%	“ _ ”%	<i>In cases where a scenario will result in the project activity passing the benchmark, an assessment of the probability of the occurrence of this scenario shall be provided.</i>
Project Cost	“ _ ”%	“ _ ”%	“ _ ”%	
Tariff	“ _ ”%	“ _ ”%	“ _ ”%	
O&M Cost	“ _ ”%	“ _ ”%	“ _ ”%	

In case the financial indicator is lower than the benchmark even with favourable variations of the key indicators previously described, it can be concluded that the CPA is unlikely to be financially attractive and would not have been implemented without CDM revenues.

Step 3: Barrier analysis

If the CPA PO uses a Barrier Analysis in order to demonstrate the additionality of the generic CPA, the latest approved version of the “Guidelines for objective demonstration and assessment of barriers should be followed. For this purpose, the tool provides two sub-steps:

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

The CPA should demonstrate that the project activity is facing barriers that:

- Prevent the implementation of the CPA

- Do not prevent the implementation of at least one of the alternatives described in the Step 1.

Sub-step 3b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed CPA)

If the identified barriers also affect other alternatives, the CPA PO should explain how they are affected less strongly than they affect the proposed CPA. In other words, demonstrate that the identified barriers do not prevent the implementation of at least one of the alternatives. Any alternative that would be prevented by the barriers identified in Sub-step 3a is not a viable alternative, and shall be eliminated from consideration.

If the CDM does not alleviate the identified barriers that prevent the implementation of the proposed CPA, the project cannot be considered additional.

Step 4: Common practice analysis

After the barrier or financial analysis, a common practice analysis should be performed, in order to determine the extent to which the proposed CPA has already diffused in the relevant sector and region. If the outcome of the common practice analysis is that the project is not the common practice in the region, and the CPA has successfully demonstrated its additionality by either the barrier or financial analysis, it will be concluded that the CPA is additional. For the common practice analysis, two sub-steps are given by the tool:

Sub-step 4a: The proposed CPA applies measure(s) that are listed in the definitions section of the tool.

Sub-step 4b: The proposed CPA does not apply any of the measures that are listed in the definitions section of the tool.

With the above description of the step-wise approach it is clear that the generic CPA meets all the applicability conditions of the criteria for inclusion as a CPA in the PoA.

B.6. Estimation of emission reductions of a generic CPA

B.6.1. Explanation of methodological choices

The chosen methodology, ACM0002 V.13.0.0 (or latest version available), establishes the parameters for calculating the baseline emissions. It is important to notice that the first parameter that needs to be calculated is the emission factor of the electric grid.

This parameter is expressed in tCO₂/MWh, and it indicates the amount of CO₂-equivalent GHG emissions that are emitted per each MWh of electricity fed into the SENI. As mentioned before, the emission factor used for the baseline emission calculations is made with the combination of two emission factors. The first one is called *Operating Margin (OM)*, and it expresses the average emission factor of the actual energy production capacity. The second component is the *Build Margin (BM)*, which reflects the future trend of the electric grid expansion, in terms of emissions per generated MWh.

Both emission factors, the OM and the BM are combined in different proportions to have a final Combined Margin (CM) that will reflect the real emission factor of Pakistan electric grid.

For the calculation of all these parameters, the ACM0002 indicates that the “Tool to calculate the emission factor for an electric system” V 02.2.1 must be used. This tool proposes six steps to be followed in order to complete the calculations. The steps are explained in the following section.

As mentioned before, for the calculation of the emission reductions that are occurring because of the presence of the CPA, it is necessary to calculate first the emission factor of the electric grid and then it will be possible to obtain the total emission reductions from the operation of the power plant.

The ACM0002 refers to the “Tool to calculate the emission factor for an electric grid” V 02.2.1, for calculating the emission factor of the electric grid, which establishes six steps for obtaining this calculation.

Step 1: Identify the relevant electricity system

For the proposed PoA, the relevant electricity system is the national grid, as there are no other relevant interconnected systems and because the project activity is delivering all its electricity to the national grid.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

The project participants can choose between the following two options to calculate the operating margin and the build margin emission factor.

- Option I: Only grid power plants are included in the calculation.
- Option II: Both, grid power plants and off-grid power plants are included in the calculation.

For the proposed PoA, only grid power plants are included in the calculation; there are no other relevant off-grid power plants in the country.

Step 3: Select a method to determine the Operating Margin (OM)

For calculating the OM, the following methods are proposed by the methodology:

- a) Simple OM
- b) Simple adjusted OM
- c) Dispatch data analysis
- d) Average OM

For the Project Activity the OM will be calculated using the simple OM method.

This election is made because in Pakistan, the low-cost/must-run power plants do not exceed the 50% of the total electricity generation during the five years previous to the baseline year. Also, there is no hourly information of the operation of the different plants, so the Dispatch data analysis cannot be used. By last, the Average OM cannot be used because not all the power plants can be considered as low-cost/must-run. As mentioned before, for the Simple adjusted OM there is no hourly information available about the operation of the power plants so the Simple OM will be chosen.

The simple OM will be calculated utilising an *Ex ante* data vintage. With this option, the emission factor will be determined at the validation stage, and no monitoring and recalculation of the emission factor during the crediting period will be required. Information of the past 3 years of operation of all the power plants connected to the grid is publicly available. It is important to mention that during the past five years of operation the total amount of electricity generated and delivered by the low-cost/must-run power plants has not been more than 50%, as shown in the following table:

Technology	Company	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
Hydel	WAPDA	30862	31953	28707	27784	28093	31811

Thermal	WAPDA	22508	21597	20427	19521	19593	14112
	IPP's	28645	34206	35231	34431	36814	37214
Thermal total		51153	55803	55658	53952	56407	51326
Nuclear	Kanupp	143	189	424	475	637	221
	Chasnupp-I	2341	2099	2653	1142	2257	2731
	Chasnupp-II						468
Nuclear total		2484	2288	3077	1617	2894	3420
Total Generation		84499	90044	87442	83353	87394	86557
Imports		146	171	199	227	249	269
Low-cost/Must-run		39.64%	38.22%	36.58%	35.55%	35.74%	41.01%

Table 3: Low-cost/must-run production¹⁴.

Step 4: Calculate the operating margin emission factor, according to the selected method.

As per guidance of the tool, the simple OM is calculated as the generation-weighted average CO₂ emissions per unit net electricity generation (tCO₂/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants.

For this calculation, Option A will be used, because the information about the net electricity generation and the CO₂ emission factor of each power unit is available.

Option A states that the simple OM emission factor is calculated based on the net electricity generation of each power unit and an emission factor of each power unit, as follows:

$$EF_{grid, OMsimple, y} = \frac{\sum_m \dot{a}EG_{m, y} * EF_{EL, m, y}}{\sum_m \dot{a}EG_{m, y}}$$

Equation 1

Where:

$EF_{grid, OMsimple, y}$	Simple Operating margin in year "y" (tCO ₂ /MWh)
$\dot{a}EG_{m, y}$	Net quantity of electricity generated and delivered to the grid by power unit "m" in year "y" (MWh)
$EF_{EL, m, y}$	CO ₂ emission factor of power unit "m" in year "y" (tCO ₂ /MWh)
m	All power units serving the grid in year "y", except low-cost/must-run power units
y	The relevant year as per the data vintage chosen in Step 3

This formula express that the emission factor of the grid in the year “y”, is the quotient of the sum of all the net electricity generated by each one of the power plants, multiplied by the emission factor of the fuel used to run that power plant, divided by the sum of all the net electricity generated by each one of the power plants.

The net quantity of electricity generated and delivered to the grid is publicly available. The emission factor of each power unit has been calculated according the tool¹⁵, with a resulting Simple OM of 0.46796 tCO₂/MWh.

Step 5: Calculate the build margin emission factor

¹⁴ According to the Table 5.2, page 93, Pakistan Energy Yearbook 2011

¹⁵ The full calculations and databases used are available to the DOE during the validation process.

As per guidance of the tool, the sample group of power units “*m*” used to calculate the build margin consist of either:

- The set of five power units that have been built most recently or;
- The set of power capacity additions in the electricity system that comprise the 20% of the system generation (in MWh) and that have been built most recently.

It also states that the project participants should use the set of power units that comprises the larger annual generation. For the baseline year, the power plants that will be included in the Build Margin calculations are:

Name of Power plant	Generation (GWh)	Year of commissioning	Technology
Halmore_Power	0	2011	Thermoelectric
CHASNUPP-II	468	2011	Nuclear
Foundation_Power	0	2011	Thermoelectric
HUB_Power,_Narowal	0	2011	Thermoelectric
Liberty Tech Power	760.62	2011	Thermoelectric
Sapphire_Electric	0	2010	Thermoelectric
Nishat Chunian	1416.58	2010	Thermoelectric
Nishat_Power	0	2010	Thermoelectric
Orient_Power	1000.68	2010	Thermoelectric
Saif_Power	0	2010	Thermoelectric
Engro_Energy	1566.21	2010	Thermoelectric
Atlas_Power	1483.76	2009	Thermoelectric
Attock_Gen	0	2009	Thermoelectric
TPS_Quetta	95.91	2005	Thermoelectric
GTPS_Shahdra	0	2005	Thermoelectric
Ghazi Barotha	7434.79	2005	Hydro
TNB_Liberty_Power	1333.12	2001	Thermoelectric
Chashma	915.75	2001	Hydro
Altern_Energy	0	2001	Thermoelectric
Uch_Power	4221.14	2000	Thermoelectric

Table 4: Build margin power plants

As commented before, the build margin is defined as the generation-weighted average emission factor of all power units “*m*” during the most recent year “*y*” for which power generation data is available. It is calculated as follows:

Equation 2:

$$EF_{grid, BM, y} = \frac{\sum_m EG_{m, y} * EF_{EL, m, y}}{\sum_m EG_{m, y}}$$

Where:

$EF_{grid, BM, y}$ = Build margin CO₂ emission factor in year “*y*” (tCO₂/MWh)

$EG_{m, y}$ = Net quantity of electricity generated and delivered to the grid by power plant “*m*” in year “*y*” (MWh)

$EF_{EL, m, y}$ = CO₂ emission factor of power plant “*m*” in year “*y*” (tCO₂/MWh)

m = Power units included in the build margin

y = Most recent historical year for which power generation data is available.

The emission factor of each power plant is calculated in the same way for the OM and the BM. The formula used for doing such calculation is the one expressed in option A2 of the tool:

Equation 3:

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} * 3.6}{h_{m,y}}$$

Where:

 $EF_{EL,m,y}$ = CO₂ emission factor of power plant “m” in year “y” (tCO₂/MWh) $EF_{CO2,m,i,y}$ = Average CO₂ emission factor of fuel type “i” used in power unit “m” in year “y” (tCO₂/GJ) $n_{m,y}$ = Average net energy conversion efficiency of power unit “m” in year “y” (ratio) m = All power units serving the grid in year “y” except low-cost/must-run power units y = The relevant year as per data vintage chosen in Step 3

As there is no information of the total volume of fuel consumed by each plant, the $EF_{EL,m,y}$ is calculated using the efficiency of each power plant. For the proposed project activity, the fuel consumption per plant is not available, therefore the default efficiency values defined in the “Tool to calculate an emission factor of an electric grid” V.2.2.1, for the power plants were used. The resulting calculated BM is 0.2407 tCO₂/MWh.

Step 6: Calculate the combined margin emission factor (CM)

As commented above, the combined margin emission factor is the combination of both emission factors, the OM and the BM. The formula to calculate it is as follows:

Equation 4:

$$EF_{grid,CM,y} = EF_{grid,OM,y} * w_{OM} + EF_{grid,BM,y} * w_{BM}$$

Where:

 $EF_{grid,OM,y}$ = Operating margin emission factor in year “y” (tCO₂/MWh) $EF_{grid,BM,y}$ = Build margin emission factor in year “y” (tCO₂/MWh) w_{OM} = Weighting of operating margin emissions factor (%) w_{BM} = Weighting of build margin emissions factor (%)

For solar and wind power generation activities, the values for w_{OM} and w_{BM} should be of 0.75 and 0.25 respectively.

Once calculated the emission factor of the Pakistani electric grid, it is necessary to calculate the project emissions and the baseline emissions. These calculations are necessary in order to calculate the total amount of emission reductions of the project activity. For the proposed project activity, the total CM is 0.41117 tCO₂/MWh.

For the proposed PoA, according to the AMC 0002 V 13.0, there are no leakage emissions or any other emissions source that could be accounted. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions, from fossil fuel use. These emission sources are to be neglected, therefore the total project emissions in the year “y” is zero, i.e. $PE_y = 0$. The CPA’s to be included in the PoA will reduce CO₂ through substitution of grid electricity, based on fossil fired power plants, with renewable electricity. The emission reduction ER_y by the project activity during a given year “y” is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y) as follows:

Equation 5:

$$ER_y = BE_y - PE_y - L_y$$

According to the ACM0002 V.13.0.0, the baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The baseline emissions are calculated as follows:

Equation 6:
$$BE_y = EGP_{PJ,y} * EF_{grid,CM,y}$$

Where:

BE_y = Baseline emissions in year “y” (tCO₂/year)

$EGP_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year “y” (MWh/year)

$EF_{grid,CM,y}$ = Combined Margin CO₂ emission factor for grid connected power generation in year “y” calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” V 02.2.1 (tCO₂/MWh)

The methodology states that the total emission reductions will be the difference between the baseline emissions and the project emissions. As mentioned before, a solar power plant has no emissions that could be accounted, so the total emission reductions will be the baseline emissions.

B.6.2. Data and parameters that are to be reported ex-ante

Data / Parameter	$EF_{grid,CM,y}$
Unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” V 02.2.1
Source of data	As per the “Tool to calculate the emission factor for an electricity system” V 02.2.1, also based on the information of the 2009 – 2011 Pakistan Energy Yearbook. The information used was the most updated available at the start of the validation process.
Value(s) applied	0.41117
Choice of data or Measurement methods and procedures	As per the “Tool to calculate the emission factor for an electricity system” V 02.2.1 The data is provided by the Ministry of Petroleum and Natural Resources and it is the only official and publicly available source for performing the calculations.”
Purpose of data	Calculation of baseline emissions.
Additional comment	N/A

B.6.3. Ex-ante calculations of emission reductions

As mentioned before, the project activity reduces carbon dioxide through substitution of grid electricity, based on fossil fired power plants, with renewable electricity. The emission reduction ER_y by the project activity during a given year y is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y) as follows:

Equation 6:
$$ER_y = BE_y - PE_y - L_y$$

For this project activity, $PE_y = L_y = 0$ and thus $ER_y = BE_y = EGP_{PJ,y} * EF_{grid,CM,y}$

Therefore, the emission reductions will rely only in the total amount of electric energy that is produced and delivered to the national grid, multiplied by the emission factor of the National Grid.

Leakage:

It is important to mention that during the operational stage of the project activity, no fossil fuels will be used and therefore the leakage emissions are considered zero, as per guidance of the ACM0002. The project will have a “motion less” operation and requires no feedstock or inputs transportation or any other logistic infrastructure.

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

B.7.1. Data and parameters to be monitored by each generic CPA

B.7.2.

Data / Parameter	$EG_{facility,y}$
Unit	MWh/y
Description	Quantity of net electricity generation supplied by the project plant to the grid in year y.
Source of data	Readings of the on-site metering connected to the grid.
Value(s) applied	Variable, depends directly on each CPA.
Measurement methods and procedures	<p>Data will be measured continuously and recorded at least monthly.</p> <p>Data will be measured in the Point of Common Coupling; that means in the project boundary. All energy losses within the boundaries of the project and also all the self-consumption electricity, will not be accounted as emission reductions.</p> <p>Data of the “onsite” measurements will be crosschecked with the data approved and provided by the buyer. The total amount of electric energy delivered to the National Grid will be measured by the meter described in section B.6.2, and according the monitoring protocol, described in Appendix 5. However the general technical description of the meter is as follows:</p> <ul style="list-style-type: none"> • Anti dust sealed • With an application of a multi tariff billing system • Real time measuring access • Bi-directional measurement capability (in case of one meter) or 2 meters for either load flow direction. • Remote data transmission capability • Massive memory storage • Accuracy 0.2%
Monitoring frequency	Continuous measurement and at least monthly recording
QA/QC procedures	Meter should be periodically calibrated at least once every three years, according the monitoring and calibration procedure explained in Appendix 5, in order to ensure a minimum error following national requirements or other requirements, whatever is more conservative. Sales receipts will be kept in order to verify the consistency of the data monitored ¹⁶ .
Purpose of data	Account the total amount of electricity that is being delivered to the grid and therefore account the total amount of emission reductions generated by the CPA.
Additional comments	All data collected will be achieved electronically and be kept at least for 2 years after the end of the last crediting period.

¹⁶ Please refer to Appendix 5 for more details about calibration procedures.

B.7.3. Description of the monitoring plan for a generic CPA

As established in the methodology, the only variable that needs to be verified and monitored during the crediting period is the total amount of electricity delivered to the electric grid, since the calculations of the emission factor are performed in a *ex ante* basis, so is not necessary to update any other variable during the crediting period.

So far the definition of the precise equipment to be installed for measuring the total amount of energy delivered to the grid is not yet available. The technical aspects of the equipment to be installed will be available once the final agreement between the CPA developer and the electric grid is finished. No direct supply of electricity to final consumers will take place, all electricity generated will be supplied to the grid. However, the suggested main characteristics that the equipment will have for measuring the total amount of electricity delivered to the electric grid at the Point of Common Coupling (PCC), are the following:

- Electronic multifunction.
- Back connection
- Anti dust sealed
- With an application of a multi tariff billing system
- Real time measuring access
- Bi-directional measurement capability (in case of one meter) or 2 meters for either load flow direction.
- Remote data transmission capability
- Massive memory storage
- Precision 0.2%¹⁷

Also, the proposed meter to be installed onsite will have the indication of maximum supply, expressed in kWh for the daily double tariff measuring system, with integration periods of 15 minutes. All meters installed will be a “plug in” type and with approximated dimensions of 200mm x 200mm.

Determination of net electricity delivered to the grid ($EG_{facility,y}$)

The project will deliver its output through a dedicated substation where two bi-directional meters will be used to determine the plant’s net amount of electricity delivered to the grid.

The parameter $EG_{facility,y}$ will be determined according to:

Equation 7:

$$EG_{facility,y} = EG_{xxkV,y} - EC_{xxkV,y}$$

where:

- | | |
|---------------|---|
| $EG_{xxkV,y}$ | = Gross electricity delivered to the grid (as measured by the meter) in period y. |
| $EC_{xxkV,y}$ | = Electricity consumption from the grid (as measured by the meter) in period y. |

Emergency procedures

Although main and backup meters will be installed in the substation, onsite meters will be available in case both meters at the substation are out. In this case, historical records will be used to account for

¹⁷ All the information about the technical specs of the meters is subjected to changes at the moment of hiring the final technology supplier. The information shown here is just a suggestion of what the project owner will require from the technology supplier.



transmission losses between the internal meters and those at the substation. The average difference between the readings of the last three months will be conservatively deducted / added from the readings obtained from the internal meters.

Emission Reductions:

Also, the emission reductions of the project will be accounted as the total electricity delivered to the grid, multiplied by the emission factor of the electric grid. In order to monitor the total emission reductions a simplified calculation model will be used.

Total Energy Generated:

To monitor the output of the electricity of the CPA, the installed meter will be sending all the information to the control cabin. All the information will be recorded and stored. The final crosscheck of the data will be with the sales receipts. Also, each one of the structures will have a direct monitoring for detecting any kind of failure in the electric system.¹⁸ All data monitored and required for verification and issuance of CER's will be kept for two years after the end of the last crediting period or the last issuance of CERs, whichever occurs latest.

The following monitoring procedure has been developed in order to generate the necessary information for verification purposes:

¹⁸ Further detail about the monitoring procedures will be available to the DOE at the validation.

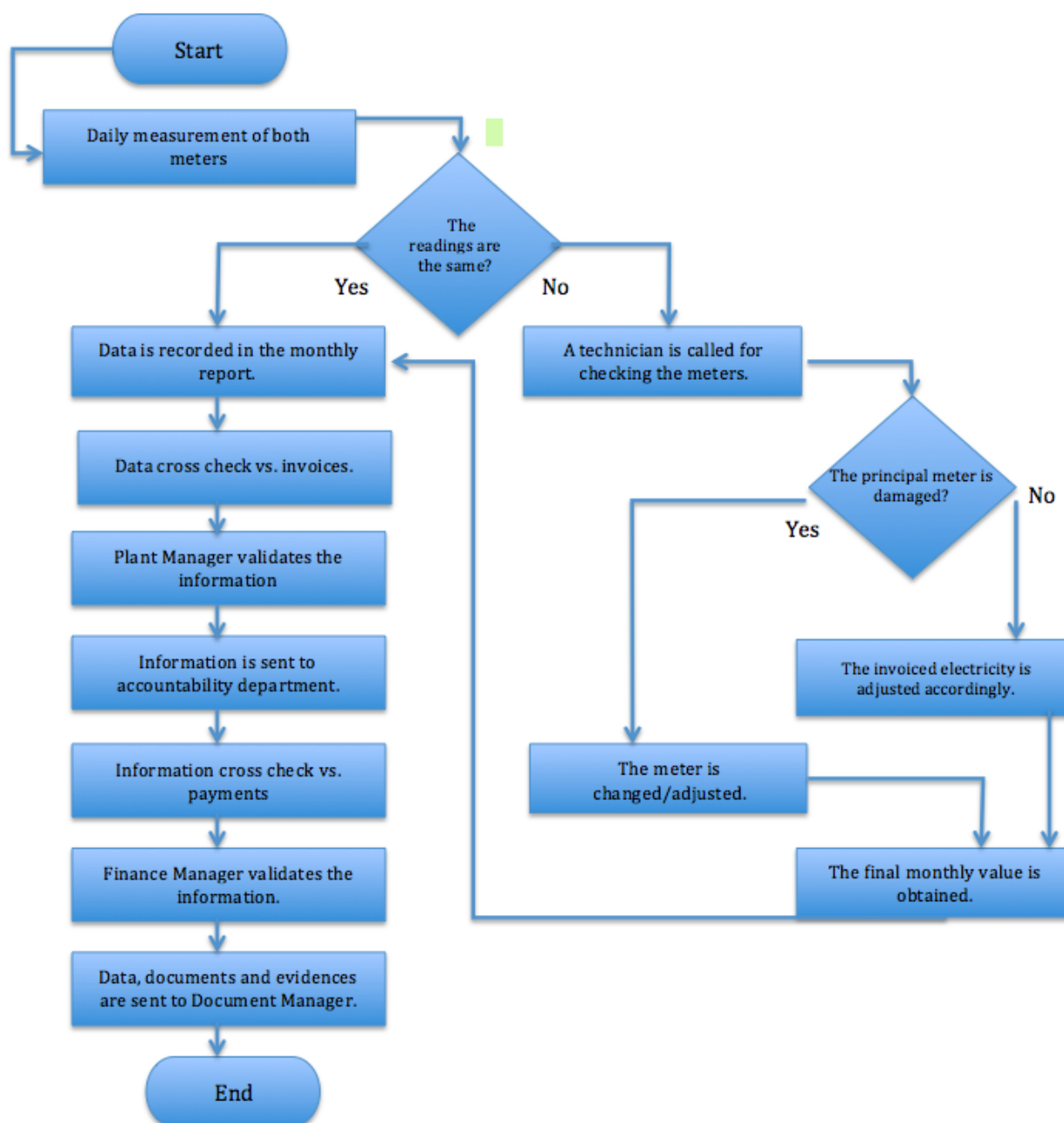


Figure 9: Monitoring Plan diagram

**Appendix 1: Contact information on entity/individual responsible for the PoA**

Organization	DACC Power Generation Company (Private) Limited
Street/P.O. Box	House No. 2-B, Street No.14, Sector F-8/3
Building	NA
City	Islamabad
State/Region	NA
Postcode	NA
Country	Pakistan
Telephone	+1-208-761-6684
Fax	+1-208-761-6684
E-mail	dougmelvin@daccassociates.com
Website	www.daccglobal.com
Contact person	Douglas C. Melvin
Title	President
Salutation	Mr.
Last name	Melvin
Middle name	C.
First name	Douglas
Department	NA
Mobile	NA
Direct fax	NA
Direct tel.	+1 208-761-6684
Personal e-mail	dougmelvin@daccassociates.com



Appendix 2: Affirmation regarding public funding

No public funding is involved on either the PoA or the CPA's.

Appendix 3: Application of methodology(ies)

The ACM0002 V.13.0 is applicable to grid-connected renewable power generation project activities under the following conditions:

Condition	Applicability to the proposed PoA
Installation of a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant)	Applicable. The proposed PoA consists in the installation of a series of new Solar PV power plants, where no other type of electric generation facility was installed.
Involve capacity addition	Not applicable. The proposed PoA is not considering any type of capacity addition in any of the CPA's.
Involve a retrofit of an existing plant	Not applicable. The CPA's included in the PoA, consists in the installation of a new Solar PV power plant.
Involve a replacement of an existing plant.	Not applicable. The CPA's included in the PoA, consists in the installation of a new Solar PV power plant.

Also the methodology is applicable under the following conditions:

Condition	Applicability to the proposed CPA
The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types; hydro power plant/unit, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit	Applicable. The proposed PoA consists in the installation of a series of new Solar PV power plants, which is consistent with the conditions of the methodology.
In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects which use Option 2: on page 10 of the methodology to calculate the parameter $EG_{PJ,y}$): the existing plant started commercial operation prior the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity	Not applicable. The CPA's included in the proposed PoA are not considering any type of capacity additions, retrofits or replacements of equipment.

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

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO ₂ /MWh
Description:	Combined Margin CO ₂ emission factor of grid connected power generation in year “y”.
Source of data used:	Calculated using the “Tool to calculate the emission factor for an electric system” V 02.2.1
Value applied:	0.41117
Justification of the choice of data or description of measurement methods and procedures actually applied :	Value calculated in order to obtain the total emission reductions from the CPA.
Any comment:	-

Data / Parameter:	$EF_{grid,OM,y}$
Data unit:	tCO ₂ /MWh
Description:	Operating Margin CO ₂ emission factor of grid connected power generation in year “y”.
Source of data used:	Calculated using the “Tool to calculate the emission factor for an electric system” V 02.2.1
Value applied:	0.46796
Justification of the choice of data or description of measurement methods and procedures actually applied :	Value calculated in order to obtain the total emission reductions from the CPA.
Any comment:	-

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO ₂ /MWh
Description:	Build Margin CO ₂ emission factor of grid connected power generation in year “y”.
Source of data used:	Calculated using the “Tool to calculate the emission factor for an electric system” V 02.2.1
Value applied:	0.24079
Justification of the choice of data or description of measurement methods and procedures actually applied :	Value calculated in order to obtain the total emission reductions from the CPA.
Any comment:	-



Company	Power Plant	Fuel type	2011 Gross Generation (GWh)	2011 Net Generation (GWh)
Hydel WAPDA	Tarbela	Water	16006.59	15,909.15
	Ghazi Barotha	Water	7434.79	7,354.11
	Mangla	Water	6087.63	5,968.77
	Warsak	Water	1040.45	1,036.26
	Chashma	Water	915.75	915.75
	Malakand	Water	0	0.00
	Dargai	Water	83	82.68
	Rasul	Water	100.99	96.00
	Shadiwal	Water	32.79	30.19
	Chichoki Malian	Water	34.49	33.59
	Nandipur	Water	44.1	43.22
	Kurram Garhi	Water	12.05	9.95
	Renala	Water	2.86	2.82
	Chitral	Water	3.45	3.43
Hydel AJKHEB	Kathai	Water	5.36	5.09
	Kundal_Shahi	Water	0.97	0.92
	Jagran	Water	0	0.00
	Leepa	Water	6.07	5.77
	Kei	Water	0.1	0.10
Thermal WAPDA	GTPS_Shahdra	-	0	0
	SPS_Faisalabad	FO	208.07	208.05
	GTPS_Faisalabad	Gas + HSD	194.3	194.02
	NGPS_Multan	FO	60.85	60.84
	TPS_Muzaffar_Garh	Gas + FO	4107.54	4107.06
	TPS_Guddu (unit 1-4)	Gas + FO	1568.63	1568.5
	TPS_Guddu (unit 5-13)	Gas + FO	4511.57	4511.48
	GTPS_Kotri	Gas	471.7	471.68
	FBC_Lakhra	Coal	88.27	88.25
	TPS_Jamshoro	Gas + FO	2803.87	2803.56
	TPS_Quetta	Gas	95.91	95.91
	TPS_Pasni	-	0	0
	GTPS_Panjgur	HSD	2.06	2.06
Thermal IPP's	AES_Lalpir	FO	1105.23	1,103.95
	AES_Pak_Gen	FO	1301.41	1,300.40
	Altern_Energy	-	0	0.00
	Attock_Gen	-	0	0.00
	Atlas_Power	FO	1483.76	1,429.01
	Engro_Energy	Gas + HSD	1566.21	1,522.40
	Fauji_Kabirwala	Gas	1119.01	1,088.50
	Foundation_Power	-	0	0.00
	Gul_Ahmed	FO	771.26	749.53
	Habibullah	Gas + HSD	831.21	810.85
	Halmore_Power	-	0	0.00
	HUBCO	FO	8568	8,114.00



	HUB_Power,_Narowal	-	0	0.00
	Japan_Power	FO + HSD	372.69	355.10
	KAPCO	Gas + FO + HSD	5859.31	5,687.72
	Kohinoor_Energy	FO	915.75	888.29
	Liberty Tech Power	FO	760.62	745.29
	Nishat Chunian	FO	1416.58	1,390.04
	Nishat_Power	-	0	0.00
	Orient_Power	Gas + HSD	1000.68	974.81
	Rousch_Power	Gas + HSD	3039.38	2,985.35
	Saba_Power	FO	262.38	245.34
	Saif_Power	-	0	0.00
	Southern_Electric	FO	482.28	466.68
	Sapphire_Electric	-	0	0.00
	Tapal_Energy	FO + HSD	804.15	793.17
	TNB_Liberty_Power	Gas	1333.12	1,329.92
	Uch_Power	Gas + HSD	4221.14	4,203.70
Nuclear	KANUPP	-	221	221.00
	CHASNUPP-I	-	2731	2,731.00
	CHASNUPP-II	-	468	468.00
Imports	Imports	-	269	269.00

Table 5: Power generation 2011

Name of Power plant	Net Generation (GWh)	Year of commissioning	Technology
Halmore Power	0	2011	Thermoelectric
CHASNUPP-II	468	2011	Nuclear
Foundation Power	0	2011	Thermoelectric
HUB_Power,_Narowal	0	2011	Thermoelectric
Liberty Tech Power	760.62	2011	Thermoelectric
Sapphire_Electric	0	2010	Thermoelectric
Nishat Chunian	1416.58	2010	Thermoelectric
Nishat_Power	0	2010	Thermoelectric
Orient_Power	1000.68	2010	Thermoelectric
Saif_Power	0	2010	Thermoelectric
Engro_Energy	1566.21	2010	Thermoelectric
Atlas_Power	1483.76	2009	Thermoelectric
Attock_Gen	0	2009	Thermoelectric
TPS_Quetta	95.91	2005	Thermoelectric
GTPS_Shahdra	0	2005	Thermoelectric
Ghazi Barotha	7434.79	2005	Hydro
TNB_Liberty_Power	1333.12	2001	Thermoelectric
Chashma	915.75	2001	Hydro
Altern_Energy	0	2001	Thermoelectric
Uch_Power	4221.14	2000	Thermoelectric

Table 6: Build margin power plants

Appendix 5: Further background information on the monitoring plan

Emission Reductions Protocol										
Month	Item	Bill No.	Net Electricity Generation, Measured, (GWh)	Net Electricity Generation Sales, (GWh)	EFy ex ante (tCO ₂ /GWh)	ER (tCO ₂)	Difference (Measurement-Sales)	Verified by	Signature	Comments
1					411.1665					
2					411.1665					
3					411.1665					
4					411.1665					
5					411.1665					
6					411.1665					
7					411.1665					
8					411.1665					
9					411.1665					
10					411.1665					
11					411.1665					
12					411.1665					

Responsible

Date

Figure 10: Monitoring protocol

This monitoring format will be used in order to generate the emission reductions for the each CPA, and also for pointing out if there is any difference between the energy that is being fed into the national grid at the PCC and the energy that is being purchased by the clients.

Each one of the following columns should be filled as follows:

- Month: The consecutive month in which the measurement is being taken.
- Item: Description of the measurement, e.g. “January Measurement”
- Bill No. The number of the bill that covers that measurement.
- Net Electricity Generation Sales (GWh): Is the total amount of electricity expressed in GWh that is being measured in the meter at the PCC.
- EFy ex-ante: Is the emission Factor for the Electric Grid. It is a constant value for the entire project. It will be updated after the first crediting period.
- ER (CO₂) Is the total amount of Emissions Reductions achieved with the project activity. It is made by multiplying the Net Electricity Sales and the EF_y ex-ante. Is expressed in tons of CO₂
- Difference: In case that there are differences between what is being measured and what is being paid by the clients (verified with the sales receipts), it should be reported here.
- Verified by: The name of the person who is reporting the data.
- Signature: The signature or personal ID of the person who is reporting the data.
- Comments: Any relevant information about the production, maintenance, etc.

This table will be presented as a summary of all the electricity generated during the lifetime of the project activity and also as a record of all the emission reductions generated by the presence of the solar plant.

It is important to mention that all the detailed technical data and any other information that is not listed here, but that is relevant to the project activity, will be fully available to DOE for the validation process.

Emergency procedures

Although main and backup meters will be installed in the substation, onsite meters will be available in case both meters at the substation are out. In this case, historical records will be used to account for transmission losses between the internal meters and those at the substation. The average difference between the readings of the last 3 months will be conservatively deducted / added from the readings obtained from the internal meters.

Description of the Procedure of Monitoring and Validation of the measurements of energy delivered to the national grid:

Objective:

This procedure aims to ensure the correct measurement of the total energy generated and delivered to the national grid, for accounting and invoicing purposes and also for the further calculation of the GHG emission reductions.

Scope:

The present procedure will involve the following areas and employees of the organization:

- General Management of the CPA
 - Plant Manager (PM)
 - Operational Chief (OC)
- Accountability office
 - Accountant (AC)
 - Document Manager (DocMan)

Equipment to be used:

- Principal electric energy meter
- Backup electric energy meter

Required and generated documents:

- Daily report (DR)
- Internal monthly report (MR)
- National Grid monthly report (NMR)
- Monthly invoice report (MI)
- Payments receipts (PR)

Activities:

- a) The OC will take a daily measurement of the readings of the principal and backup meters.
 - i. If there is a disparity on the measurements between the two meters, it will be required the revision of both of them by a certified technician. The technician will then proceed with the calibration, repair or change of the damaged meter.
 - ii. If the principal meter is the one presenting failures on the measurement of the energy, the official amount of energy will be the reading of the backup meter. In order to generate the corresponding invoices, and adjustment on the total amount reported to the national grid will be made, supported by the verification and authorization of the certified technician.
- b) The OC will capture the daily measurement in the DR.
- c) The OC will generate the MR
- d) The OC will cross check the information of the MR and the MI.
- e) The National Grid will generate the NMR for the entire project.
- f) The OC will cross check the information of the MR and the NMR.
- g) If there are differences between the measurements reported in both reports, an auditing will take place with an authorized representative of the National Electric Grid, in order to make the necessary adjustments.
- h) Once the information is validated it will be sent to the PM for verification.

- i) The validated information will be sent to the AC for revision and starting the invoicing process for the payment to be obtained from the National Grid.
- j) Once all data is clear and assessed, all the original documents and evidences will be sent to the DocMan. The archive will hold all evidences until the year 2025 or two years after the last crediting period, whatever occurs later.

It is important to mention that there is no specific frequency for the calibration of the meters. They will be checked at least every three years, however the only procedure for calibrating them is as described above, and the repair will take place only if the measurements of both meters (principal and backup) present a significant difference between them. All the meters are “factory calibrated” so when a meter presents a mal function it is replaced with a new one, therefore no re-calibration takes place.

Appendix 6: Abbreviation list

AC	Accountant
BM	Build Margin
CM	Combined Margin
CDM	Clean Development Mechanism
CPA	CDM Program Activity
DocMan	Document Manager
DR	Daily Report
FM	Finance Manager
MI	Monthly Invoice Report
MR	Monthly Report
NMR	National Grid Monthly Report
OM	Operating Margin
OP	Operational Chief
PoA	Programme of Activities
PDD	Project Design Document
PM	Plant Manager
PO	Project Owner
PR	Payment Receipts
SENI	Sistema Eléctrico Nacional Interconectado – National Grid.
UNFCCC	United Nations Framework Convention for Climate Change