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

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"Programme for the promotion and development of grid-connected solar PV projects in Latin America"
Version 1.4
12/09/2012

A.2. Purpose and general description of the PoA

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The main goal of the "Programme for the promotion and development of grid-connected solar PV projects in Latin America" CDM Programme of Activities is to transfer technology and know-how for the conversion of a widely available renewable energy source, solar energy, into clean, sustainable electricity.

The solar photovoltaic (PV) technologies, and especially those that provide electricity directly to an electricity system, are already used (mostly through subsidies and special feed-in tariffs) in Europe and North America. Driven by the ambition to create a low-carbon economy, those regions have been very active in research and development, manufacturing, demonstration, financing, promotion, training of human resources, adaptation of policies and all other aspects necessary for taking the use of this renewable energy source closer to viability. Stepping on these experiences and developments, it has become plausible to start promoting the use of the technology in less technologically-advanced regions.

The leading role of Europe and North America to promote solar power is ironic, given that these are the regions with least sunlight reaching the surface of the Earth. It is the current challenge of the solar industry and all stakeholders to enable the spread of this renewable energy technology to regions where it can be employed more efficiently through lowering barriers and transferring know-how.

The so-called Sunbelt, or the region in the World where solar irradiance is highest, is between 35º South and 35º North, i.e., mostly in non-Annex I countries, as can be seen in Figure 1 below. Within Latin America, the most suitable areas for capturing solar energy are located mainly in the north of Chile and south of Peru. Solarpack Chile S.A. was established in late 2008 in order to introduce the solar photovoltaic technology in Chile, build the necessary know-how, help create suitable regulatory and business conditions for its development, and from there also promote it in other countries in the region.

Mid-2011, Solarpack Chile S.A. started with the construction of a pilot solar plant near the city of Calama, which has become a showcase for the challenges and opportunities of this technology in Chile and Latin America. Among the challenges identified have been the very high costs of electricity generation through photovoltaics, even in optimal locations. In Europe and elsewhere this has been mitigated to various degrees through a range of subsidies and feed-in tariffs, or dedicated financing mechanisms. An important mechanism to alleviate this barrier in Latin America has been identified in the CDM, given the emission reduction potential of this technology especially in regions with high percentage of electricity generated using fossil fuels.

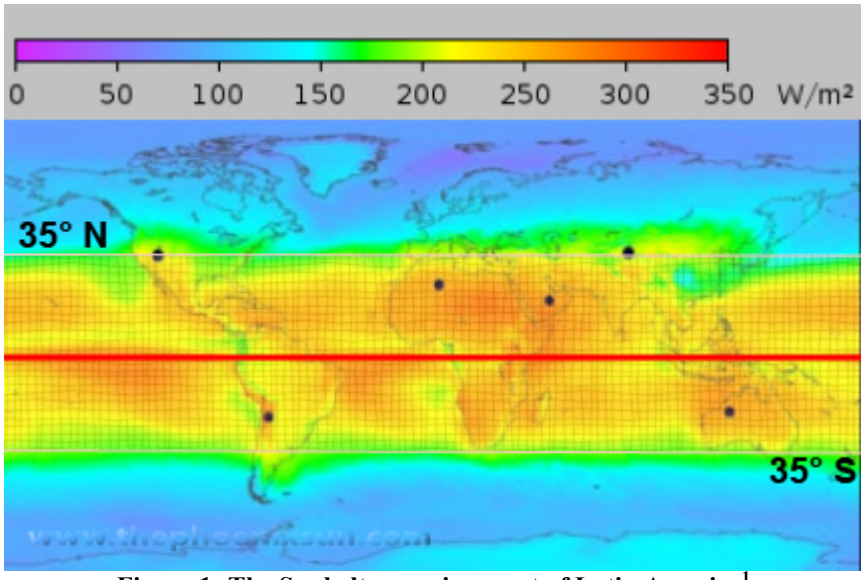

Figure 1: The Sunbelt, covering most of Latin America[1]

The role of a CDM Programme of Activities for the promotion of solar photovoltaic technologies in Latin America can be seen not just as a financial mechanism to bridge the gap between expected and required returns. It is most of all a way of providing further legitimacy and structure that can attract and organize key stakeholders, coordinate their efforts and streamline the development of grid-connected solar photovoltaic projects.

General Framework of the PoA

The general framework of the programme is therefore one in which the Coordinating and Managing Entity (CME) centralizes efforts that are common to all Component Project Activities (CPAs), i.e. all projects included in the programme. In terms of CDM, this includes the communication with the UNFCCC and the Designated National Authority (DNA), managing of the validation, registration, inclusions, verification and issuance processes, (alone or with the help of carbon consultants), overall monitoring of the PoA and quality control of the monitoring at the CPA level. Beyond CDM, the CME streamlines the access to technology, know-how, carbon finance, the promotion of the technology, awareness raising, and market and policy analysis. The CME also may take up parts of the project development, construction, operation or maintenance of the plants. Most CPAs are separate legal entities in which Solarpack Chile S.A. may or may not be a shareholder. Each CPA is therefore responsible for the implementation, operation and maintenance of the power plant, for the calibration of the monitoring equipment, for the monitoring and reporting of data relevant to the emission reduction calculations and the CDM in general. The CME alone and through carbon consultants will provide continuous assistance so as to ensure that all requirements of the CDM are fulfilled at any point of the project.

Stated goal of the PoA

The goal of the PoA is thus to promote the implementation of grid-connected solar photovoltaic projects in order to:

- transfer know-how and technology to the participating Host Country
- help diversify the energy generation matrix in participating Host Country and contribute to a cleaner development
- help substitute electricity generated (partly) using fossil fuels and reduce emissions of greenhouse gases

[1] The Phoenix Sun, available at http://thephoenixsun.com/archives/tag/sunbelt-countries , last visited: 18/04/2012.

Sustainability benefits

The technology to be employed by the CPAs under the PoA is environmentally safe and sound and contributes to the sustainable development of the region and to the stated goals of the PoA:

- The CPAs provide an alternative to fossil fuel-based electricity and large-scale hydropower in the region
- They displace electricity in the national grid thus reducing greenhouse gas emissions. In Chile the development of renewable energy has gained particular importance in the last few years since the quantities of natural gas being imported from Argentina have been decreased drastically and the energy sector relies ever more heavily on coal, especially in the Northern part of the country.
- The technology employed has very limited negative impact on the environment and the local communities, as it implies little use of water, does not generate emissions during its operations and has little if any impact on soils. The visual and acoustic impact of a CPA is also very small, especially in comparison to other power plants of similar capacity.
- They are the expression of the transfer of technology and know-how from regions with experience in grid-connected solar power, especially Europe and China.
- PV plants generally employ about 20 people per MW capacity during construction and 1-2 persons during O&M. They contribute to the development of local communities also indirectly, through the provision of goods and services for the power plants and their employees and not least by attracting media attention to the region.
- As proven by the pilot plant installed near the city of Calama, a CPA is an excellent and accessible platform for training and awareness raising for the wider public, from the local community to the highest political ranks.

Voluntary action

As a private company, the Coordinating and Managing Entity has no legal obligation to undertake the proposed Programme of Activities. The PoA is therefore a voluntary action.

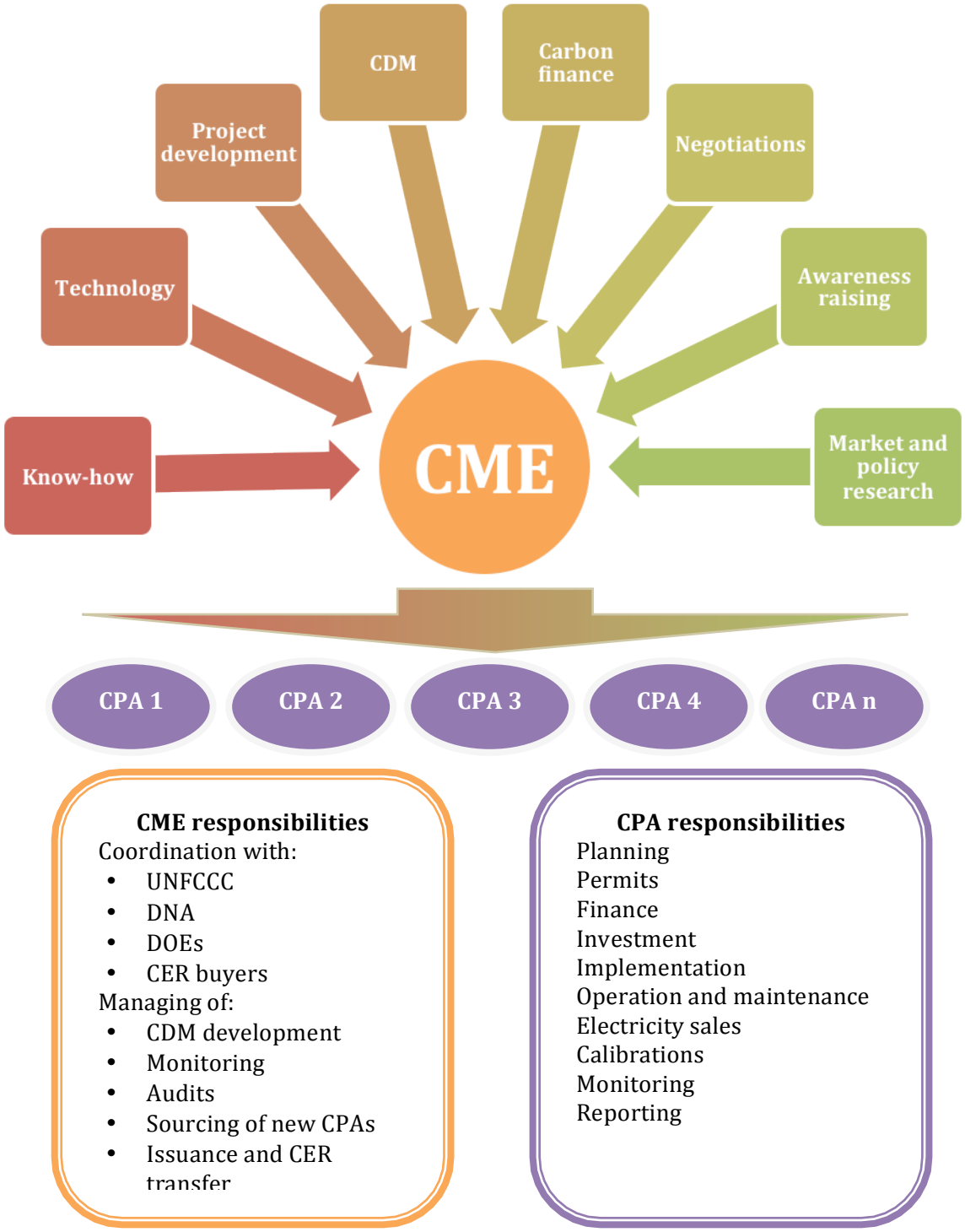

Figure 2: General operating and implementing framework of the PoA

A.3. CMEs and participants of PoA

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The only project participant in the PoA at the time of validation is the Coordinating/Managing Entity (CME)

Coordinating/Managing Entity

The CME of the proposed PoA is Solarpack Chile S.A. It is a private company established in Chile late 2008 with the specific purpose of promoting solar photovoltaic projects in Latin America. Since then it has been developing a portfolio of possible projects, and analyzing the risks and opportunities in the region. At the time of development of the PoA, Solarpack Chile S.A. holds the presidency of the solar energy section of the Chilean Association for Non-conventional Renewable Energy (ACERA). Moreover, it has been raising awareness and attracting interest towards this technology through numerous conferences and workshops with institutions, sector organizations, private companies and the wider public. These include:

- Presentation at the Elecgas conference, Santiago, October 2010 (an important conference of the electricity and gas sectors in Chile)
- Wind Power Semniar Hotel Plaza Santiago, March 2011
- Presentation at the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) representing the position of Chile for the Rio+20 Summit, August 2011
- Presentation at the Diego Portales University, September 2010
- Presentation at the International Workshop for Solar Energy, Arica, June 2011
- Presentation "Invest in Non-Conventional Renewable Energy (NCRE) in Chile" Chamber of Congress, Navara, Spain, November 2010
- Presentation to the Regional Government of Tarapacá, Iquique, September 2011
- "Foro SING" (Forum for the Northern Interconnected System), Antofagasta, October 2009
- Presentation on photovoltaic solar power to the Chilean Association for NCRE (ACERA), March 2011

Arguably, Solarpack Chile S.A.'s most important contribution to development of the grid-connected photovoltaics sector in the region has been the development of the first such power plant of 1MW installed capacity in Chile. This demonstration plant has attracted ample attention and interest from a wide range of stakeholders, including the media and the wider public, and includes a research and development facility with different types of PV modules and measurement equipment.

The transfer of technology and know-how mentioned in the previous section is done on several levels:

- Internally, the employees of Solarpack Chile S.A. undergo initial training in Spain, where they gain first experiences with the design and construction of solar PV plants, taking advantage of the existing experience from projects in Spain and internationally. Thereafter, the employees of Solarpack Chile S.A. are in continuous contact with their counterparts from the offices of Solarpack Corporación Tecnológica S.L. (a major shareholder of Solarpack Chile S.A.) in Spain, and benefit from field visits of experienced staff from Europe providing for a continuous learning and training experience.
- Externally, the Solarpack group has taken an approach of openness and active interaction with all stakeholders, which is expressed in the numerous seminars, conferences and workshops in the region that Solarpack Chile S.A. has participated in. The philosophy employed is that the sharing of knowledge and experience with all stakeholders contributes much more to the development of the sector in general than what private enterprise could deliver on its own.
- In the social sphere, the Solarpack group promotes the guided visits by schools and education centers to their plants, including innumerable students, teachers, professors and scientists. Missions from governments that are interested in promoting the technology in their respective countries have also been guests to Solarpack Corporación Tecnológica S.L.'s installations in Spain. Among them was the National Energy Commission of Chile.
- The pilot power plant in Calama, in turn, has been visited even before its commissioning by political figures from all ranks, including the Energy Minister of Chile, Senators, and MPs from

the Spanish community of Biscay.[2] All these visits get broad media coverage and help raise awareness about renewable energy and solar photovoltaics in particular not only with key decision makers, but within the society in general.

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)
Chile (Host)	Solarpack Chile S.A.	No

Further parties may be included in the PoA at a later point of time (after registration of the PoA) following the CDM modalities and procedures.

A.5. Physical/ Geographical boundary of the PoA

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The geographical boundary of the proposed PoA is those regions of Chile covered by the regional electricity transmission grids, considering all relevant national laws and regulations in those regions.

The current coverage of the four transmission grids in Chile is presented in the map below.
The laws and regulations in Chile governing the implementation of the CPAs do not vary between the different transmission grids[3]. However, the geographic conditions, current supply and demand of electricity and other factors make the four networks significantly different in terms of investment conditions, electricity tariffs, available infrastructure, energy mix, climatic conditions, etc.

[2] See for example an article in the local newspaper Loactual from 15/03/2012, available under: http://www.loactual.cl/noticias/15-03-2012/Diputados_espanoles_visitaron_planta_industrial_fotovoltaica_en_Chuquicamata Last visited: 20/03/2012

[3] All relevant laws and regulations for the energy sector are listed by the National Energy Commission (CNE) under: http://www.cne.cl/normativas/energias/electricidad/529-sector-electrico for electricity in general and http://www.cne.cl/normativas/energias/renovables for renewable energy. All links last visited: 15/03/2012
The relevant environmental laws and regulations in Chile are explained in section E of the present document.

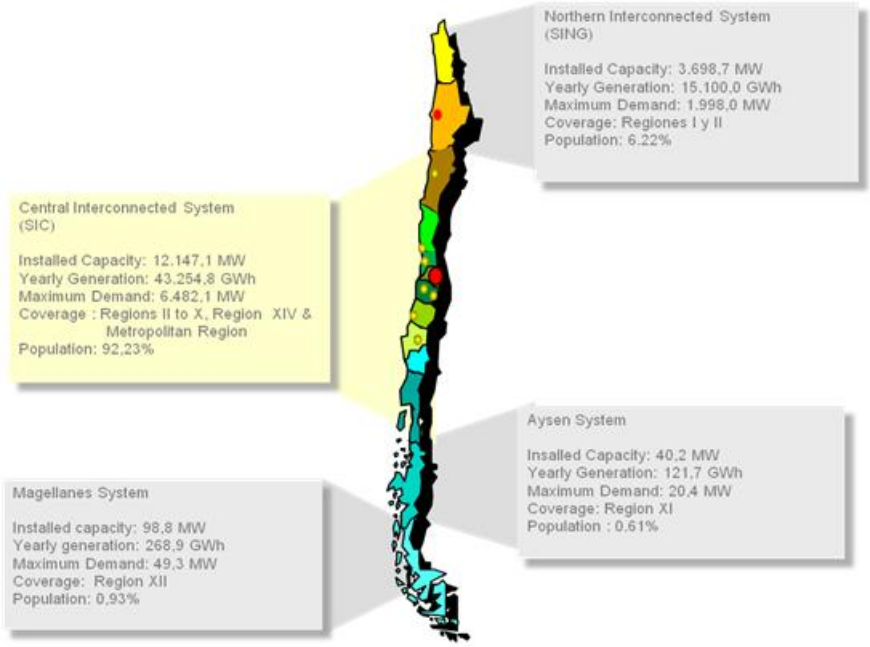

Figure 3: Map of the electricity systems in Chile[4]

A.6. Technologies/measures

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The present PoA encompasses one technology/measure, namely grid-connected power plants using photovoltaic technology to turn solar irradiance into electrical current with the purpose of delivering electricity to a national grid. All electricity systems included in the Programme Boundary contain a significant percentage of fossil fuel-fired power plants in their generation matrix. A CPA under the present PoA thus displaces fossil fuel-based electricity with electricity from an abundant renewable source.

Type:

Although there are two main types of solar power technologies - photovoltaics (PV) and concentrated solar power (CSP) - a CPA under the present PoA would be a PV power plant and not be a CSP plant.

Photovoltaic technologies have seen rapid and dynamic development in the last years with different technology sub-types being developed in parallel. These include various crystalline silicon technologies, thin film-based technologies, concentrator photovoltaics and the so-called "third generation photovoltaics", such as organic PV cells and hybrid dye-sensitised solar cells.[5] Most of these technologies currently have very low efficiencies of converting light into electricity, but advances in all of them are made very rapidly. Moreover, photovoltaic technologies are especially susceptible to material limitations, such as the availability of silicone or rare metals used in thin films. For these reasons, it is difficult to predict what the preferred technology sub-type would be in the next years, and the PoA is therefore not limited to any particular type of photovoltaic technology.

A CPA under the present PoA is therefore one that employs only PV applications and specifically those PV applications that are grid-connected and ground-mounted.

Scale:

[4] Based on CNE data

[5] European Photovoltaic Industry Association (2011) "Solar Generation 6. Solar Photovoltaic Electricity Empowering the World" Available at: http://www.epia.org/publications/epiapublications/solar-generation-6.html Last visited: 11.07.2012

Due to the modular nature of the PV technology, PV projects worldwide range in scale from several Watts in solar home systems to solar parks with over 100 MW installed capacity. A CPA would be located at the higher end of this spectrum and represent a solar park, starting from 100 KW of nominal installed capacity.

Components:
A ground-mounted, grid-connected PV power plant presents the following main features, described in further detail below[6]:

- Photovoltaic modules to collect sunlight
- An inverter to transform direct current (DC) to alternate current (AC)
- Support structures to orient the PV modules toward the Sun.
- Transformers to raise the power from low to medium voltage
- Grid connection (including where applicable transformation from medium to high voltage)

The system components, excluding the PV modules, are referred to as the balance of system (BOS) components.

- ***PV cells, modules and arrays***

The solar cell is the basic unit of a PV system. PV cells are generally made either from:

- crystalline silicon, sliced from ingots or castings,
- from grown ribbons or
- from alternative semiconductor materials deposited in thin layers on a low-cost backing (Thin Film).

Figure 4: Solar Cell represents the basic functioning and energy flow of a PV cell, which converts sunlight to electric current through the use of semiconductors.[7]

Cells are connected together to form larger units called modules. Thin sheets of Ethyl Vinyl Acetate (EVA) or Polyvinyl Butyral (PVB) are usually used to bind cells together and to provide weather protection. The modules are normally enclosed between a transparent cover (usually glass) and a weatherproof backing sheet (typically made from a thin polymer). Modules can be framed for extra mechanical strength and durability. Thin Film modules are usually encapsulated between two sheets of glass, so a frame is not needed.

Modules can be connected to each other in series (known as an array) to increase the total voltage produced by the system. The arrays are connected in parallel to increase the system current.
The power generated by PV modules varies from a few watts (typically 20 to 60 Wp) up to 300 to 350 Wp depending on module size and the technology used.
Standard crystalline silicon modules currently contain about 60 to 72 solar cells and have a nominal power ranging from 120 to 300 Wp depending on size and efficiency. Standard Thin Film modules have lower nominal power (60 to 120 Wp) and their size is generally smaller. Modules can be sized according to the site where they will be placed and installed quickly. They are robust, reliable and weatherproof. Module producers usually guarantee a power output of 80% of the Wp, even after 20 to 25 years of use. Module lifetime is typically considered 25 years, although such values are estimates, as the technology is too new to have adequate tests and data on an appropriate timescale.

[6] ibid
[7] European Communities 2009, "Photovoltaic Solar Energy" Available at: http://ec.europa.eu/energy/publications/doc/2009_report-solar-energy.pdf . Last visited: 04/07/2012

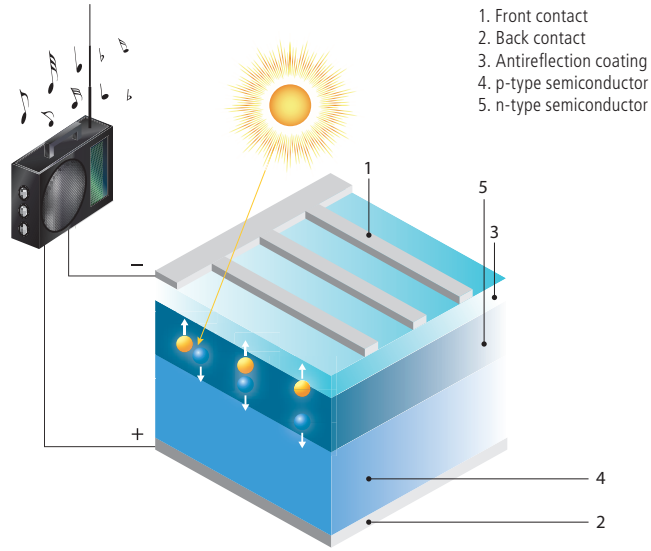

Figure 4: Solar Cell

- ***Inverters***

Inverters convert the DC power generated by a PV module to AC power. This makes the system compatible with the electricity distribution network and most common electrical appliances. An inverter is essential for grid-connected PV systems. Inverters are offered in a wide range of power classes ranging from a few hundred watts (normally for stand-alone systems), to several kW (the most frequently used range) and even up to 2,000 kW central inverters for large-scale systems.

- ***Transformation centers***

These are devices for changing the voltage of the electrical current, normally from low voltage to medium voltage.

- ***Grid connection***

Despite the modular nature of PV power plants, it is possible to define the physical boundaries of a CPA as the set of modules and arrays that form a unit connected together to a national electricity system through the same connection. Depending on the case, the equipment necessary for such a connection could include:

- Sectioning center (grid connecting system)
- Electrical substation (voltage increase)
- Transmission lines

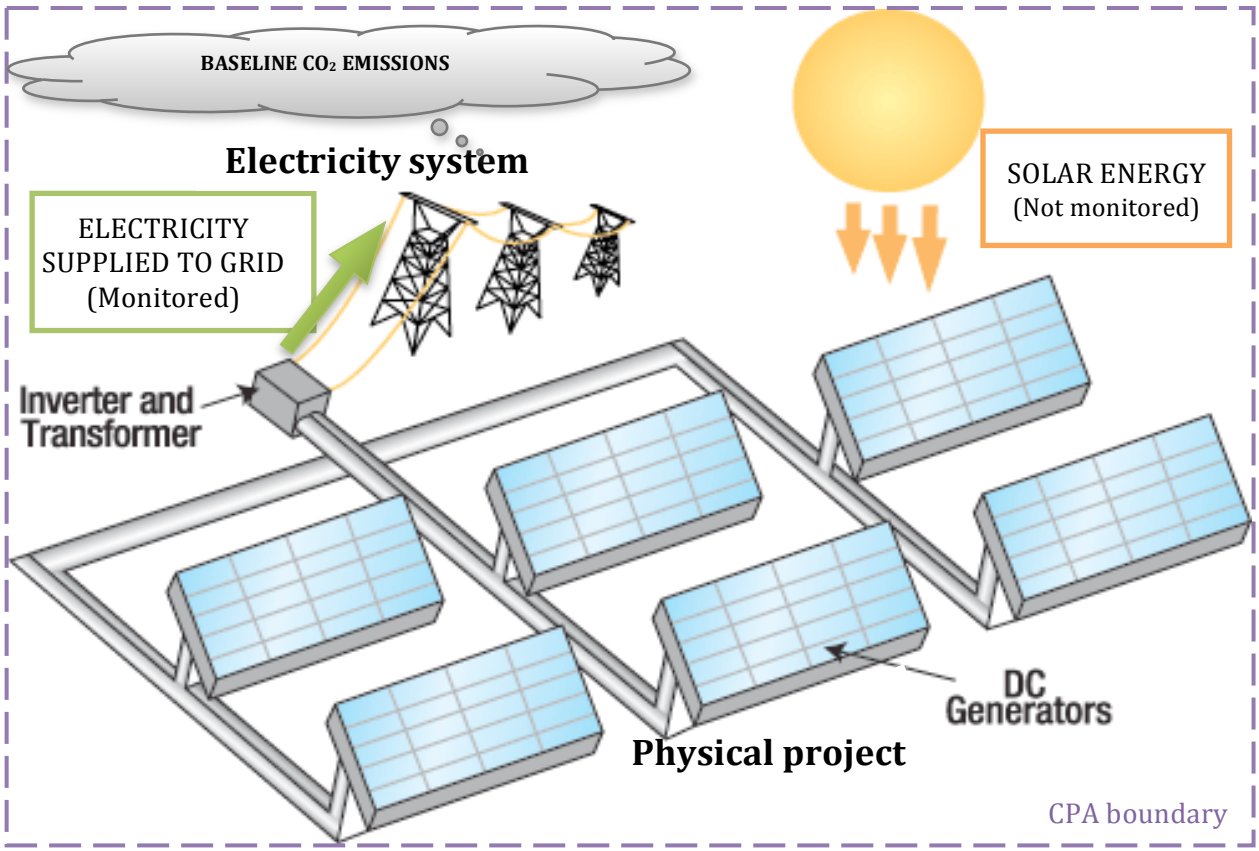

Figure 5: Schematic representation of a CPA under the PoA[8]

Figure 6: An example of a ground-mounted, grid-connected solar PV plant[9]

[8] Source: Tennessee Valley Authority. Avaliable at: http://www.tva.gov/greenpowerswitch/solar_diagram.htm Last visited: 22/05/2012

Project, pre-project and baseline scenarios

A CPA under the present PoA is a greenfield project, i.e. it is built where no other power plant existed before the project. As the programme and the CPAs are voluntary actions, the baseline scenario of a CPA is the continuation of the current practice, and thus both the baseline and pre-project scenarios are the same. The baseline scenario is therefore one in which *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*, in accordance with the methodology ACM0002, version 13.0.0, EB67 (The Methodology) The facilities and systems in the baseline scenario are determined as per the EF tool ("Tool to calculate the emission factor for an electricity system" version 02.2.1, EB 63) and further information on those is presented in Appendix 4 of each Specific CPA-DD.

A.7. Public funding of PoA

>> The Programme of Activities does not receive public funding.

[9] Source: Solarpack S.A. 2009: Environmental Impact Declaration Calama Solar 1, p.21 Available at: https://www.e-seia.cl/expediente/ficha/fichaPrincipal.php?modo=ficha&id_expediente=4012348, Last visited: 10/07/2012

SECTION B. Demonstration of additionality and development of eligibility criteria
B.1. Demonstration of additionality for PoA
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Although it is in line with the Host Country's efforts of promotion of renewable energy, the proposed Programme of Activities is a private undertaking and therefore a voluntary coordinated action. CDM has a significant positive impact on the implementation of the CPAs in the Programme and on the Programme as a whole. The PoA centralizes and streamlines not only the CPA's access to CDM, but also many technical, administrative, political and financial aspects of the implementation of the voluntary action. This is meant to lower the barriers to implementation of the CPAs, to contribute to attracting investment in grid-connected solar photovoltaics in the region, and ultimately to reduce greenhouse gas emissions.

Barriers defined by the European Photovoltaic Industry Association (EPIA)
The barriers to the development of the grid-connected solar photovoltaic sector in Latin America have been described in Chapters 2.3 and 3 of the European Photovoltaic Industry Association (EPIA) 2010 report "Unlocking the Sunbelt Potential of Photovoltaics".[10] These barriers include:

- Lack of Know-How
- Insufficient policy support/level playing field
- Lack of competitively priced finance
- Grid infrastructure
- Implementation and service

The barriers are alleviated both by the platform that the CME establishes with the PoA, and by the access to CDM. The latter is important mainly as an additional source of finance that improves the financial viability of the projects, but it also provides more credibility and helps spread awareness about the technology especially among policy makers, investors and banks.

For similar reasons, grid-connected solar power projects with less than 15MW installed capacity have been included in the "positive list" of technologies eligible for automatic additionality by the Executive Board of the UNFCCC[11]. This is a clear indication that all CPAs under 15MW are additional. However, due to the fact that the present PoA applies a large-scale methodology, the automatic additionality option is not used, even if most CPAs are expected to have capacities lower than 15MW.

Although from the analysis of the barriers at the time of validation of the PoA it can be concluded that from the present point of view none of the proposed CPAs would occur without access to CDM, the additionality of each proposed CPA has to be demonstrated taking into account the time of investment decision or particular details of the project.

According to the PoA Standard[12], PoAs that consist of one or more large scale projects as CPAs (as is the case of the present PoA) shall include eligibility criteria derived from all the relevant requirements contained in the additionality section of the large scale methodologies. The applicable methodology for the present PoA is ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", (Version 13.0.0) (the Methodology)[13], and it requires each project that installs a Greenfield power plant (which is the case of all CPAs under this PoA) to apply the "Tool

[10] Available at: http://www.epia.org/index.php?id=18 Last visited: 10/07/2012
[11] Attachment A of Appendix B of the Simplified modalities and procedures for small-scale CDM project activities, version 08.0, EB63
[12] Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities¨ version 01.0, EB65.
[13] The Methodology and tools are available at http://cdm.unfccc.int/methodologies/PAmethodologies/approved . Last visited: 12/07/2012

for demonstration and assessment of additionality" (current version 06.6.0., EB 65, henceforth "the Additionality Tool").

Moreover, the Methodology, in the section "Project activity under a programme of activities", establishes further requirements for the definition of eligibility criteria for the demonstration of additionality for the inclusion of CPAs under a PoA. These include the consideration of the following technical and economic parameters:

(a) Technical and economic parameters that are technology specific (e.g. ranges of load factors, sizes of installation, wind speed)
(b) Parameters reflecting the investment climate:
    (i) Subsidies or other financial flows;
    (ii) Tariffs;
    (iii) Depreciation;
    (iv) Power purchase agreements;
    (v) Other parameters determining market circumstances;
(c) Ranges of costs (capital investment, operating and maintenance costs, etc.) and revenues (income from electricity sale, subsidies/fiscal incentives, ODA).

The eligibility criteria related to costs, revenues and investment climate shall be updated every two years in order to correctly reflect the technical and market circumstances of a CPA implementation.

On the basis of the abovementioned requirements, the Additionality Tool was applied in a generic manner in order to establish the relevant eligibility criteria to guarantee that any CPA included in the PoA is additional. The application of the Additionality Tool is presented in the following steps:

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

According to the Methodology, in cases where the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is defined as follows:
"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.""

As the baseline scenario is already prescribed in the applied approved methodology, two alternatives to a proposed CPA are considered and no further analysis is required:[14]

- Alternative 1: no action by the CPA implementer, resulting in the continuation of the current situation and generation of electricity in the grid the CPA is connected to.
- Alternative 2: the CPA undertaken without CDM

It is unlikely that generating electricity in existing power plants in the grid (Alternative 1) can become not in compliance with existing laws and regulations. As long as the CPA implementer is not legally required to implement a photovoltaic solar power plant, not undertaking a proposed CPA (Alternative 3) is also consistent with mandatory laws and regulations.
Therefore a CPA under the present PoA is not the only legal alternative.
Each CPA implementer is further to demonstrate within the specific CPA-DD that its project complies with mandatory laws and regulations, with or without CDM.

Resulting eligibility criterion from Step 1:

[14] See paragraph 115 of the Clean Development Mechanism Validation and Verification Standard, version 2.0, EB65 Annex 4

The CPA implementer shall declare that all mandatory legal and regulatory requirements at the time of the CPA inclusion and which might constitute any obligation to the CPA implementer will be complied with.

Step 2: Investment Analysis:
According to the Additionality Tool, this step is optional. The present PoA establishes eligibility criteria based on this option of the Additionality Tool, which are to be used by CPAs that cannot be considered the First of their Kind as per step 3 below.

An investment analysis has been performed in a generic manner and thus results in ranges of variables for which any CPA can be considered eligible and additional, as required by the Methodology. Given that the costs and the revenues of photovoltaic projects grow in a linear manner with the increase of the capacity of the plants, the generic analysis has been performed on a per-megawatt nominal installed capacity basis. This allows for the establishment of ranges of investment costs per MW and revenues per MWh that are applicable for a plant of any installed capacity eligible under the current PoA (i.e. larger than 100kW). The third crucial variable in the investment analysis is the load factor of the plant, which determines the amount of electricity generated per year and thus the revenues of the plant. In order to simplify the representation of the eligibility criteria, the ranges of investment costs and revenues are presented in several batches for different levels of Plant Load Factor that are realistic for a photovoltaic power plant in Chile.

Sub-step 2a: Determine appropriate analysis method
The appropriate method for analysis is considered to be the benchmark analysis (Option III).

Sub-step 2b: Apply benchmark analysis
The indicator that has been chosen as the most suitable is Project Internal Rate of Return (IRR).
In accordance with the "Guidelines on the Assessment of Investment Analysis", the benchmark applicable to CPAs under the present PoA shall be a benchmark supplied by relevant national authorities. The benchmark applicable currently to electricity generation projects in Chile has been stipulated in article 165 of the Decree DFL-4/20018 of the Chilean Ministry of the Economy, Development and Reconstruction[15] and is equal to 10% on a pre-tax basis in real terms.

Sub-step 2c: Calculation and comparison of financial parameters

The calculation of the Project IRR of installing a Megawatt of solar photovoltaic plant is presented in excel format and has been submitted along with the PoA-DD for validation. All assumptions of critical parameters have been substantiated with reliable sources or evidence, provided to the DOE for validation. Furthermore, the Project IRR has been calculated pre-tax in real terms in accordance with the applicable benchmark identified in step 2b above and according to the "Guidelines for the assessment of investment analysis" version 05.0. The following table presents the key fixed parameters. The full list of references is presented in the excel version of the model.

Table 1: Main parameters for the estimation of a Project IRR

Technical and economic parameters considered in the generic model	Value	Reference
Installed Capacity	1 MW	Assumption
Yearly degradation of the PV modules	0.5%	Enertis Due Diligence Report

[15] Available at: http://www.economia.cl/transparencia/pdf/decretos_fuerza_ley/DFL%204,%202006.pdf , last visited: 28/05/2012

Technical Lifetime	25 years	Environmental Permit, Calama Solar 1 project
Yearly Operation and Maintenance cost	15,000 USD/MW	Calculated by Solarpack Chile S.A. and confirmed as reasonable in the Enertis Due Diligence Report
Yearly equipment replacement cost years 3-5 (% of investment)	0.125%	Enertis Due Diligence Report
Yearly equipment replacement cost years 6-20 (% of investment)	0.250%	Enertis Due Diligence Report
Connection toll	0 USD/MWh	Conservatively assumed to be 0, as some renewable energy projects in Chile do not need to pay connection tolls.
Yearly Land Lease cost	10,978 USD/MW	Calculated from price per hectare indicated by the Ministry of National Assets, January 2012
Yearly Insurance Costs - damage insurance (% over investment)	0.15%	Indicative offer from AON, April 2011
Yearly Insurance Costs - Limited liability (% over revenues)	0.40%	Indicative offer from AON, April 2011
Expected lifetime of the asset for depreciation purposes	20 years	Conservative estimate based on national regulations
Exchange Rate Chilean Peso	500 CLP/USD	National Bank of Chile
Exchange Rate: Unit of Account (UF)	22,619 CLP/CLF	National Bank of Chile
Residual Accounting Value	0 USD	All assets are fully depreciated before the last year of analysis, and therefore the residual value is 0.
Fair Value in last year of analysis	Variable, in USD	A fair value calculation for the remaining technical lifetime of the assets is included as a fixed calculation in the model. The value itself depends on the values determined for each proposed CPA of the project revenues per MWh and the Plant Load Factor.

The following table contains the technical and economic variables that have not been fixed in the model, but are to be determined for each CPA to which this procedure applies:

Technical and economic parameters to be provided by each CPA	**Value**	**Reference**
Investment cost	Variable, in USD/MW	Variable determined for each proposed CPA. Relevant ranges are presented.
Project revenues	Variable, in USD/MWh	Variable determined for each proposed CPA. Relevant ranges are presented.

Plant Load Factor (PLF)	Variable	Variable determined for each proposed CPA. Relevant ranges are presented.

For the purpose of the additionality demonstration for the present PoA, the following definitions apply:

- **Investment costs** are the costs of installing a CPA per MW of nominal installed capacity and include, inter alia:
  - Civil works
  - Machinery and equipment
  - General and engineering expenses
  - Logistics and transport

  Subsidies or Official Development Assistance shall be deducted from the Investment Costs per MW considered for the additionality assessment.

- **Revenues** are the revenues of the CPA per MWh sold to the electricity grid in real terms, and include, inter alia:
  - Expected electricity tariff
  - Any premia/subsidies, e.g. for renewable energy generation

- **Plant Load Factor** is the percentage of time the CPA would have to operate at full capacity in order to generate the expected amount of electricity (electricity generation per year divided by 8760). The PLF shall be calculated on the basis of the nominal installed capacity.

The result of this model, which aims at assessing the additionality of all possible cases of CPAs is presented in the form of tables in Appendix 3 below. Each table corresponds to a certain range of load factors, which are likely to occur in future proposed CPAs, and uses for the calculation the most conservative (highest) load factor from the range. Each table presents a range of revenues per MWh and a range of investment costs per MW that can be expected for possible future CPAs. The table presents the pre-tax Project IRR (real terms) that results from the combination of a given level of revenue and investment cost for that particular range of load factors. All eligible cases, i.e. all combinations of load factor, revenue and investment cost that result in a Project IRR lower than the benchmark are marked in green, and all those not eligible are marked in red.
Therefore, the compliance with step 2a of the Additionality Tool of a CPA consist simply in checking whether the combination of load factor, revenues per MWh and investment cost per MW expected for the CPA at the time of investment decision is an eligible combination.

As required by the Methodology, the eligibility criteria related to costs, revenues, and investment climate shall be updated every two years in order to correctly reflect the technical and market circumstances of a CPA implementation. Therefore, an update of the economic parameters considered in the investment model, including benchmark and operational and other costs, will result in an updated set of tables in Appendix 3 every two years after the registration of the PoA.

Sub-step 2d: Sensitivity analysis
According to the "Guidelines on the assessment of investment analysis", version 05, sensitivity analysis is to be applied to all the variables that affect the income and costs of a CPA the most. These variables are determined to be the following:

Cost variables
Photovoltaic power plants are highly capital-intensive projects and have low operational and maintenance costs. The latter represent only about 10% of the costs of a CPA and are thus not included in the sensitivity analysis and are fixed in the generic model for any CPA. The investment costs, however, are the major cost component in a photovoltaic power project and are thus subject to sensitivity analysis.

Income variables
The income of a CPA has two main components: the electricity tariff/revenues per MWh and the electricity generated. The former is usually estimated at the time of taking an investment decision through an electricity price study, a feasibility study, or a power purchase agreement or similar contract. The latter depends mainly on the global horizontal irradiance (GHR) at the project location, and can be expressed as the load factor of the power plant, i.e. the percentage of time it would have to operate at full capacity in order to generate the expected amount of electricity. The expected electricity generation is calculated in feasibility studies, applications for governmental permits, or using specialized software and databases. The Plant Load Factor is derived from those estimates. Sensitivity analysis is to be performed on both variables.

The sensitivity analysis will be performed for each CPA, by varying each of these parameters separately (investment cost, plant load factor and revenue per MWh) by 10% and taking the most conservative resulting value for the eligibility check. The procedure is described in Appendix 3 below. Given that not all values that may be applicable to a CPA are presented in the tables, and the values to be considered in the assessment are always the next more conservative values, this increases the de facto sensitivity variation by up to 6% per variable.

The result of this analysis would be in compliance with Step 2 of the Additionality Tool, as it would demonstrate that the proposed CPA is not economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs).

Resulting eligibility criterion from Step 2:
The proposed CPA shall have a combination of expected revenue per MWh (including any renewable energy premium), investment costs per MW, and load factor at the time of taking the investment decision or CPA inclusion (whichever occurs earlier), that is within the eligible ranges as per Appendix 3 of the PoA-DD.

Outcome of Step 2:
For each CPA that has an eligible combination of expected revenue per MWh, investment cost per MW and load factor as described above, the outcome of Step 2 as per the Additionality Tool is that the proposed CPA is unlikely to be financially/economically attractive.

Step 3: Barrier Analysis

The barrier analysis step is optional according to the Additionality Tool. CPA implementers may choose between Step 2 and Step 3 of the tool as per the eligibility criteria of the present PoA.

Sub-step 3a: Identify barriers that would prevent the implementation of the proposed CPA:

First-of-its-kind (FoiK)
The barriers to the implementation of grid-connected photovoltaic power plants in Latin America can be best illustrated by the fact that in Chile, as in most countries, there are no such power plants installed to date. Therefore, according to the Additionality Tool, currently such projects face a barrier due to prevailing practice, and in particular that of a proposed CPA being the first-of-its-kind in its respective region.

The FoiK barrier is demonstrated if a project is the first in the applicable geographical area that applies a technology that is different from any other technologies able to deliver the same output and that have started commercial operation in the applicable geographical area before the start date of the project[16]. In

[16] CPAs applying this barrier need to adopt a fixed crediting period of 10 years.

order to establish an eligibility criterion based on this requirement for future CPAs, the FoiK barrier analysis has been applied in a generic manner to the entire PoA.

The applicable geographical area has therefore been defined as the territory of Chile. The power plants in operation in all electricity grids in Chile are listed in the file Installed Generation Capacity (Capacidad Instalada de Generación in Spanish) available at the Chilean Energy Commission (CNE) website[17]. This source constitutes "Relevant statistical data from national or international statistics" as per paragraph 42 c) of the Additionality Tool and is thus appropriate for the determination of the existence of the FOIK barrier.

According to the national statistics, there is no grid-connected solar photovoltaic power plant installed in any of the electricity grids in Chile. All the existing power plants apply a different technology, for all sizes of installation and ranges of load factors. This means that a CPA under the present PoA would be the first of its kind to apply the technology in the relevant geographical area. According to the Additionality Tool, any such CPA can be considered FOIK, as long it is applying for a non-renewable crediting period of 10 years.
This also confirms the conclusion of the EPIA study cited above that solar photovoltaic power plants face significant barriers in Chile and elsewhere in Latin America that prevent their implementation.

Given that the data shows conclusively that there are no cases of grid-connected solar photovoltaic power plants in Chile, the consideration of access to technology, subsidies, promotional policies and legal regulations, as required by the Additionality Tool, as well as tariffs, depreciation and power purchase agreements and ranges of costs and revenues (as required by the Methodology for application in PoAs) is not necessary.

Outcome:
In accordance with the Methodology, the Additionality tool and the PoA-DD, the FOIK barrier is demonstrated for any CPA included in the present PoA that has selected a crediting period of 10 years.

However, as this situation may change in the future, the FOIK barrier shall further be confirmed at the time of submission of a CPA for inclusion. Should the starting date of the CPA be earlier than the date of inclusion, then the starting date shall be taken as reference.

Sub-step 3b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed CPA):
This step is not applicable to project activities facing the First-of-its-kind barrier, as a CPA under the present PoA is covered under the Measures listed in paragraph 6 of the Additionality Tool.

Considering all of the above, the resulting eligibility criterion is:

A CPA can be considered First-of-its-Kind in Chile as long as:
1) there is no ground-mounted grid-connected solar photovoltaic power plant in Chile that has started commercial operation before the submission of the CPA for inclusion, or before the starting date of the CPA, whichever is earlier; AND
2) the selected crediting period is 10 years, non-renewable.

As this eligibility criterion refers to the investment climate in the host country, following the Methodology, the analysis of existing installations shall be revisited every 2 years after registration of the PoA and the eligibility criterion shall be updated. Updated eligibility criteria may limit the scope of

[17] CNE 2012. "Installed Generation Capacity". Available at: http://www.cne.cl/images/stories/estadisticas/energia/Electricidad/capacidad_instalada_de_generacion.xls Last visited: 14/05/2012

projects that can be considered FOIK based on the installed capacity, geographical location, or other considerations as per the latest CDM guidance on FOIK. However, projects that are not FOIK as per a new definition may still be additional as per the Methodology and the Additionality Tool. This is also the reason why an alternative approach to demonstration of additionality has been established based on Step 2 of the Additionality tool.

Step 4: Common Practice Analysis

According to paragraph 43 of the Additionality Tool, this step is not applicable to project activities facing the First-of-its-kind barrier. It is, however, to be applied to CPAs that demonstrate additionality through an investment analysis.

As a CPA under the present PoA is a measure listed in paragraph 6 of the Additionality Tool, the following step-wise procedure for common practice analysis applies. It has been applied in the present document in a generic manner for the whole of Chile, using the entire range of eligible power plants, and assuming as a starting date the start of validation of the PoA (31/03/2012).

Step 1: Calculate applicable output range as +/-50% of the design [output or] capacity of the proposed project activity.

As stated in Eligibility Criterion 3 below, a CPA is eligible under the present PoA if it has a design capacity of minimum 100kW. Thus, the applicable range is design capacity of minimum 50kW.

Step 2: In the applicable geographical area, identify all power plants that deliver the same output or capacity, within the applicable output range calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number N_{all}. Registered CDM project activities shall not be included in this.

The applicable geographical area is the area of the host country. The power plants in operation in all electricity grids in Chile are listed in the file "Installed Generation Capacity" ("Capacidad Instalada de Generación" in Spanish), available at the Chilean Energy Commission (CNE) website[18] The table below provides the number of grid-connected power plants that have started commercial operation and have a capacity of minimum 50kW. According to the CNE database, all power plants in Chile have an installed capacity higher than 50kW. The CDM status of projects has been checked on the UNFCCC website[19].

Electricity Grid	**Number of Plants**	**Reference**
SING	20	CNE 2012
SIC	164	CNE 2012
AYSÉN	20	CNE 2012
MAGALLANES	5	CNE 2012
Total	**209**	
CDM projects	**15**	**UNFCCC**
N_{all}	**194**	

Step 3: Within plants identified in Step 2, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number N_{diff}.

[18] Available at: http://www.cne.cl/estadisticas/energia/electricidad, last visited: 09/07/2012
[19] Available at: http://cdm.unfccc.int/Projects/projsearch.html, last visited: 01/06/2012

All grid-connected plants in Chile use a technology different than solar photovoltaic.

Therefore, $N_{diff} = 194$

Step 4: Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity.

$F = 1-194/194 = 0 < 0.2$
$N_{all} - N_{diff} = 194-194 = 0 < 3$

Outcome of the Common Practice Analysis:

A CPA under the present PoA would therefore **not be "common practice"** within the grid-connected electricity generation sector in Chile, as the factor F is **not** greater than 0.2 and $N_{all}-N_{diff}$ is **not** greater than 3.
Therefore, no eligibility criterion has been set in relation to common practice analysis for future CPAs. However, as common practice analysis refers to the investment climate of the Host Country, the analysis will be repeated every 2 years after registration of the PoA and an eligibility criterion may be introduced at a later point of time.

Outcome of the additionality demonstration:

It has been demonstrated above that the additionality of any proposed CPA can be determined with clear eligibility criteria. These criteria are the following:

1. The proposed CPA shall have a combination of expected revenue per MWh (including any renewable energy premium), investment costs per MW, and load factor at the time of taking the investment decision or CPA inclusion (whichever occurs earlier), that is within the eligible ranges as per Appendix 3 of the PoA-DD.
2. A CPA can be considered First-of-its-Kind in Chile as long as:
    1) there is no ground-mounted grid-connected solar photovoltaic power plant that has started commercial operation before the submission of the CPA for inclusion, or before the starting date of the CPA, whichever is earlier; AND
    2) the selected crediting period is 10 years, non-renewable.

If either of the two eligibility criteria is fulfilled, the proposed CPA is additional in accordance with the PoA Standard, the Methodology and the Additionality Tool.

B.2. Eligibility criteria for inclusion of a CPA in the PoA
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The following is a list of Eligibility Criteria that are based on the requirements of the PoA Standard and will be used for the technical review and due diligence process of inclusion of CPAs under the PoA. The applicability of the different requirements of the PoA Standard is also discussed below. As described in section C, the CME has developed a PoA Management System that includes provisions and procedures to ensure that all CPAs proposed for inclusion by a Designated Operational Entity (DOE) comply with the eligibility criteria.

In terms of the competencies of the CME to assess the eligibility of the CPA there are two distinct cases:

1. For CPAs that are developed by Solarpack Chile S.A., Solarpack Chile S.A. has access to all the relevant information to check, among others:
    a. The starting date of the CPA
    b. Alternatives to the CPA
    c. The location of the CPA
2. For all other CPAs, the CME has to gain these competencies through the explicit agreement of the CPA implementer.

Therefore, some of the eligibility criteria below list the conditions that need to be fulfilled so as for the CME to be able to perform the eligibility check for projects not developed by Solarpack Chile S.A.

	PoA Standard requirement	Applicability	Eligibility criterion
1	The geographical boundary of the CPA including any time-induced boundary consistent with the geographical boundary set in the PoA	Applicable	1. The geographical boundary of the CPA shall be within the borders of Chile and include all power plants connected to the specific regional electricity grid that the CPA is connected to.
2	Conditions that avoid double counting of emission reductions like unique identifications of product and end-user locations (e.g. programme logo)	Applicable	2. The CPA implementer shall provide the CME the exact geographic reference of the location of the power plant. A CPA is only eligible if there is no other solar PV power plant registered as a CDM project or included in another PoA in the same location.
3	The specifications of technology/ measure including the level and type of service, performance specifications including compliance with testing/ certifications;	Applicable	3.1. As per the applicable methodology, the CPA shall consist in a Greenfield grid-connected solar photovoltaic power plant that generates electricity from solar energy and has an installed capacity of at least 100 kW.
			3.2. The CPA Implementer shall provide evidence that the equipment used in the project will comply with national/international standards or certifications.
4	Conditions to check the start date of the CPA through documentary evidence	Applicable	4. A CPA is only eligible if its starting date is after the starting date of the PoA. If the starting date of a CPA is in the future, this eligibility criterion shall be considered fulfilled. In order for Solarpack Chile S.A. to check the start date of the CPA, the CPA shall either be developed by Solarpack Chile S.A.[20] or the CPA Implementer shall declare that: 1) all information available relevant to the timeline of construction and implementation of the project and real action related to it has been provided to the CME, *and* 2) any such relevant information will be disclosed as it becomes available.
5	Conditions that ensure compliance with applicability and other requirements of single or multiple methodologies applied by CPAs	Applicable	5. As per the applicable methodology, the CPA shall install a new solar power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant).
6	The conditions that	Applicable	6. *The CPA shall fulfil at least one of the below*

[20] Solarpack Chile S.A. is a developer of a CPA if it is a shareholder of the project implementer, and/or if it has conducted feasibility studies and other project development activities on behalf of the project implementer. In such cases Solarpack Chile S.A. has access to the documentary evidence required for checking the starting date of the CPA.

	PoA Standard requirement	Applicability	Eligibility criterion
	ensure that CPAs meet the requirements pertaining to the demonstration of additionality [...]		*criteria:* 6.1: The proposed CPA shall have a combination of expected revenue per MWh (including any renewable energy premium), investment costs per MW, and load factor at the time of taking the investment decision or CPA inclusion (whichever occurs earlier), that is within the eligible ranges as per Appendix 3 of the PoA-DD 6.2: A CPA can be considered First-of-its-Kind in Chile as long as: 1) there is no ground-mounted grid-connected solar photovoltaic power plant that has started commercial operation in Chile before the submission of the CPA for inclusion, or before the starting date of the CPA, whichever is earlier; AND 2) the selected crediting period is 10 years, non-renewable.
7	The PoA-specific requirements stipulated by the CME including any conditions related to undertaking local stakeholder consultations and environmental impact analysis	Applicable	7. A stakeholder consultation has been performed at the CPA level as specified in section F of the PoA-DD.
8			8. The CPA implementer shall provide the CME with proof of the compliance of the power plant with the Host Country's environmental regulations, as specified in section E of the PoA-DD.
9	Conditions to provide an affirmation that funding from Annex I parties, if any, does not result in a diversion of official development assistance	Applicable	9. The CPA implementer shall provide the CME with an affirmation that funding from Annex I parties, if any, does not result in a diversion of official development assistance.
10	Where applicable, target group (e.g. domestic/commercial/industrial, rural/urban, grid- connected/off-grid) and distribution mechanisms (e.g. direct installation)	Applicable	10. CPAs shall constitute a grid-connected power plant.
11	Where applicable, the conditions related to sampling requirements for a PoA in accordance with the approved guidelines/standard from the Board pertaining to sampling and surveys;	Not applicable, as none of the variables used for the emission reduction calculations is derived through sampling.	Not Applicable.

	PoA Standard requirement	Applicability	Eligibility criterion
12	Where applicable, the conditions that ensure that every CPA in aggregate meets the small-scale or microscale threshold criteria and remains within those thresholds throughout the crediting period of the CPA	Not applicable as the CPAs do not apply the CDM simplified modalities and procedures.	Not Applicable.
13	Where applicable, the requirements for the debundling check, in case CPAs belong to small-scale (SSC) or microscale project categories.	Not applicable as the CPAs do not apply the CDM simplified modalities and procedures.	Not Applicable.
14	Others	Applicable.	11. The CPA implementer shall declare that all mandatory legal and regulatory requirements at the time of the CPA inclusion and which might constitute any obligation to the CPA implementer will be complied with.

B.3. Application of methodologies

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As described in section A.6. above, the technology/measure applied by each CPA under the PoA is the generation of renewable electricity in a grid-connected power plant, i.e. a ground-mounted solar photovoltaic power plant.

The approved baseline and monitoring methodology applied to each CPA included in the PoA is the following:
ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", (Version 13.0.0.) (the Methodology)[21]

It is applied in combination with the following tools:

- "Tool to calculate the emission factor for an electricity system" (Version 02.2.1), (the EF Tool)
- "Tool for the demonstration and assessment of additionality" (Version 06.0.0), (the Additionality Tool)

None of the parameters included in the emission reduction calculations are to be determined through sampling, and therefore no sampling plan is envisioned for the PoA.

[21] The Methodology and tools are available at http://cdm.unfccc.int/methodologies/PAmethodologies/approved . Last visited: 12/07/2012

SECTION C. Management system

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A Management System was developed for the PoA following the prescriptions of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities¨ version 01.0, EB65. The Management System has been provided to the DOE for validation, and includes guidelines as to the following:

(a) A clear definition of roles and responsibilities of personnel involved in the process of inclusion of CPAs, including a review of their competencies;
(b) Records of arrangements for training and capacity development for personnel;
(c) Procedures for technical review of inclusion of CPAs;
(d) A procedure to avoid double counting (e.g. to avoid the case of including a new CPA that has already been registered either as a CDM project activity or as a CPA of another PoA);
(e) Records and documentation control process for each CPA under the PoA;
(f) Measures for continuous improvements of the PoA management system;
(g) Other relevant elements, such as:
    a. Description of the PoA
    b. Other relevant procedures, e.g. for updating eligibility criteria and renewal of the crediting period.

The guidelines are based on current CDM modalities and procedures[22] and will be updated and improved following any relevant developments in those.

1. Due Diligence Process

Before the CPA is included in the PoA, the CME will conduct a due diligence process to assess the eligibility of the CPA. This will be based on all relevant documentary evidence available at the time, to which the CPA implementer will grant the CME access. In cases where the eligibility of the CPA cannot be demonstrated, but can be achieved through reasonable and viable clarifications and corrections, the CME shall recommend specific tasks to the CME implementer, for example:

- To conduct a Stakeholder Consultation Meeting
- To provide further documentary evidence
- To provide clarifications as to presented documentation
- To commission/conduct a study
- To sign a declaration

If and only if the CME can, on the basis of documentary evidence, establish the eligibility of the CPA, will a CPA-DD be completed and submitted to a DOE for inclusion of the CPA in the PoA.

2. Record keeping system

Each CPA corresponds to a specific power plant connected to an electricity system. As such, information for its installed capacity and performance is collected and made public by the respective system's Transmission System Operator and/or the respective energy authorities.

Nevertheless, the Management System establishes a record keeping system with key design and commercial information for each CPA, for each of the following processes:

(a) CPA due diligence and eligibility check
(b) CPA-DD development
(c) CPA inclusion
(d) CPA implementation

[22] Available under http://cdm.unfccc.int/Reference/index.html , last visited: 29/02/2012

(e) CPA monitoring
(f) Renewal of the CPA crediting period

Copies of the references for each of the entries will be stored by the CME for the duration of the PoA plus an additional 2 years.
The status of implementation and eligibility of the CPA are first checked during the due diligence process before the CME proposes a CPA for inclusion to a DOE. During this process, all relevant documents, including contracts, purchase orders, concession documents, etc. are checked by the CME in order to determine the starting date of the CPA. Thereafter, the CPA implementer is required to inform the CME of any change in the status of implementation of the CPA, including and especially the starting date and the date of commissioning. Additionally, the CME shall follow up with all CPA implementers to update the status of each CPA until commissioning on a regular basis as to ensure that the record keeping for each project is up to date and complete with references.

3. System to avoid double counting

A procedure to check that the proposed CPA is not registered as a CDM project or included as a CPA under another PoA is established in Monitoring System and is part of the Due Diligence process before the inclusion of a CPA in the PoA.

The procedure is the following:

Short title	**Double Counting**
Title	Procedure to avoid double counting
Purpose	Avoid the case of including a new CPA that has already been registered either as a CDM project activity or as a CPA of another PoA)
Timing	During the Due Diligence process before inclusion of a CPA
Responsible	CME, CDM consultant
Accountable	CME
Steps	1. Check the geographic location of the proposed CPA with respective geographic coordinates (see Location procedure)
	2. Check on-site for other PV power plants and make sure their geographic coordinates do not enter the parameter of the coordinates provided for the proposed CPA.
	3. Check if in the respective region there are registered CDM projects or CPAs of other PoAs that are grid-connected solar photovoltaic power plants. Check the geographic coordinates of those projects/CPAs as reported in their (P)DDs and confirm that they are different from those of the proposed CPA
	4. Check all CPAs included in the PoA, and confirm that the geographic location is different from that of the proposed CPA
Outcome	Confirmation for the CPA in the CPA-DD with references
Documents	E.g.: Environmental Permit, Land Lease documents, Tender Documents, Connection contract, etc.
Database Entries	Geographic references of the CPA, type (system) of the geographic references
Justification	A CPA under the present PoA is a stationary application and thus the geographic location of the plant is sufficient to identify it at

	any point.

4. Agreement to be subscribed to the PoA

Before the CPA is included in the PoA, the CPA implementer will declare explicitly to agree that the CPA be subscribed to the PoA.

SECTION D. Duration of PoA

D.1. Start date of PoA

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The start date of the PoA is the 19/12/2011, the date on which Solarpack Chile S.A. signed an agreement with Bridge Builders for the design and development of the CDM PoA[23].

D.2. Length of the PoA

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28 years

SECTION E. Environmental impacts

E.1. Level at which environmental analysis is undertaken

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The impact of the CPA on the local community and environment can vary significantly depending on the exact location, context and technical specifications of the project. Therefore it is considered that Environmental Analysis done at the CPA level is more appropriate.

E.2. Analysis of the environmental impacts

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N/A

E.3. Environmental impact assessment

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Given the diversity of locations and contexts where the CPAs could be installed, it is to be defined for each CPA separately whether an Environmental Impact Assessment is required under the Host Country law.

A short description of the current procedure for this under Chilean regulations is presented below. It is only meant as an informative summary of the Host Party regulations and not as an obligation for the inclusion of CPAs under the PoA. As per the Eligibility Criteria above, the CPA implementer shall provide proof of compliance with the applicable Environment Regulations.

In Chile, the assessment of the environmental impacts and the environmental approval of a specific project is regulated by the Law N° 19.300[24], "The Environmental General Basis Law" ("Ley de Bases Generales del Medio Ambiente").

According to Law 19.300 and its modification (law N° 20.417), every project developer has to analyse if their project requires an Environmental Impact Assessment, following the specific criteria stated in the Environmental Impact Assessment System (SEIA) Regulations[25].

[23] The contract has been provided to the DOE for validaiton.
[24] Last version available at http://www.leychile.cl/Navegar?idNorma=30667, Last visited: 13/12/2011

According to article 3c) of the SEIA regulations, electricity generation plants with an installed capacity greater than 3 MW need to be subjected to the Environmental Impact Assessment System before starting construction. So do electricity generation plants that have an installed capacity of less than 3MW but are located in a national park, national reserve, natural monument, virgin zone reserve, nature sanctuary, marine park, marine reserve or any other area under official protection. (Article 3p) of the SEIA regulations) Finally, it should be mentioned that high voltage transmission lines and substations with voltages higher than 23 kilovolts must also be submitted to the SEIA as stated in article 10 b) of Law 19.300 and article 3 b) of the SEIA regulation, therefore even if they are part of a power plant of less than 3MW capacity, the entire project would need to be submitted to the SEIA.

Once established that the project is to be submitted to the system, there are two types of procedures, depending on the potential impact of the project.

- Projects with lower environmental impact as per Article 11 of the 19300 Law need to present an Environmental Impact Declaration
- Projects with higher potential environmental impacts as per the same Article need to present an Environmental Impact Assessment.

The conditions that make the use of an Environmental Impact Assessment necessary, in summary, are the following:

1. Risks to the health of the population, due to the quantity and quality of the effluents, emissions and residues.
2. Significant adverse effects over the quantity and quality of the renewable natural resources, including soil, water and air.
3. Resettlement of human communities or significant alteration of the system of life and customs of human groups.
4. Location close to protected settlements, resources or areas, conservation areas, wetlands or glaciers, susceptible to impacts from the power plant; location in a territory with special environmental value.
5. Significant alteration in terms of scale or duration, of the landscape or tourist value of an area.
6. Alteration of monuments, sites with anthropological, archaeological, historical or general value, and those defined as cultural heritage.

In general, PV plants have very limited quantities of effluents of any kind. They have very low impact, if any, on water and air quality and only a limited possible impact on soils. Moreover, due to its limited height, a CPA does not cause significant alterations of the landscape. Therefore, an Environmental Impact Assessment would probably only be required for CPAs located in special or protected areas as per points 3 to 6 above. Nevertheless, the requirement is to be confirmed by the respective environmental authorities and/or the DNA for each CPA.

SECTION F. Local stakeholder comments

F.1. Solicitation of comments from local stakeholders

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The Local Stakeholder Consultations will be held at a CPA level, taking into consideration the different circumstances of each CPA.

Public consultations for a specific project on a national level are often carried out as part of the procedure to grant environmental permits, by the respective authority, depending on the project's scale and location.

[25] http://www.ist.cl/acerca_ley/leyes/ds30.pdf, summarized in http://www.sea.gob.cl/contenido/que-es-el-sistema-de-evaluacion-de-impacto-ambiental , Last visited: 13/12/2011

In Chile, the public consultations of this type are carried out for projects that present a Environmental Impact Declaration (DIA) or an Environmental Impact Assessment (EIA), and currently involve representatives of a wide variety of public institutions covering issues from cultural heritage through infrastructure to healthcare and environment. Most importantly, they involve obligatorily the municipality of the locality of the project as the democratically elected representative of the interests of the local community. Local community representatives (legal or natural persons) are free to participate in a public consultation.

For projects that have no environmental impacts on the local community, (those that submit a DIA), the participation of community representatives beyond the municipality and public institutions is voluntary. As per the regulations of the National Electronic System for Environmental Impact Assessment (SEIA), the wider public is duly informed of the commencement of the consultation and had the chance to participate in the process. Nationally, this is done by CONAMA publishing the list of projects entering a stage of evaluation of their environmental impact declaration in the Official Gazette of the country. Locally, this is done by the municipality and the local environmental authority, who publish the list of projects entering that stage, and are to be located in the area, in a public space in their premises[26]. Both natural and juridical persons have the right to comment on the project during the evaluation stage. Such natural or juridical persons have 10 days to present a request for participation and 20 days thereafter to present their comments.[27]

For projects that do present environmental impacts, the participation of community representatives is more strictly regulated.[28] In this case, in addition to the process for DIAs, a summary of the project is to be posted in the Official Gazette and a regional or a national newspaper, and the period for submitting comments is 60 days.

All documentation submitted by the project proponents for both types of projects is furthermore posted online on the environmental impact assessment system's (SEIA) website and viewable by anyone, not only for the period of evaluation but permanently.[29]

In terms of the actual consultation process, the full information about the proposed project (DIA/EIA, declarations, proof of ownership, etc) is sent to all participants. To ensure transparency and the unbiased representation of the information, it is the environmental authority who invites the public and the institutions to participate in the process and disseminates the relevant information. The participants are required to evaluate the possible impacts of the project and may raise questions and clarification requests; suggest additional measures, studies, or permits to be taken into account; or issue a statement of conformity with the project. The environmental impact evaluation procedure requires a response by the project implementer to all questions and taking due account of all comments in the project design documentation, as each stakeholder/institution involved needs to provide its final approval of the project. All comments and responses are publicly available on the SEIA website.

Considering all of the above, it can be concluded that the public consultation process obligatory for any project that presents a DIA or an EIA in Chile fulfils the requirements of the CDM Project Standard for a public consultation process.

Therefore, if a public consultation of relevant regional and national institutions, including the local municipality has taken place during such a procedure, and has been concluded before the submission of the CPA for inclusion, this public consultation is to be described in the specific CPA-DD and will be considered sufficient for the purposes of CDM.

[26] Article 54, Regulations of the Environmental Impact Assessment System, available at: http://www.ist.cl/acerca_ley/leyes/ds30.pdf Last visited 12/07/2012

[27] SEIA website, available at: http://drupal.e-seia.cl/contenido/que-entendemos-por-participacion-ciudadana-en-el-sistema-de-evaluacion-de-impacto-ambienta , last visited: 12/07/2012

[28] A summary of the requirements can be found on: http://drupal.e-seia.cl/contenido/que-entendemos-por-participacion-ciudadana-en-el-sistema-de-evaluacion-de-impacto-ambienta , last visited: 09/07/2012

[29] The project search page is available at: http://seia.sea.gob.cl/busqueda/buscarProyecto.php Last visited: 09/07/2012

If, due to the scale and other circumstances of the project, no such consultation has been required or undertaken, the implementing entity shall organize a local stakeholder consultation meeting, inviting the comments of stakeholders from the local community. This meeting shall take place before the CPA has been submitted to a DOE for inclusion. The procedure for checking the validity of a stakeholder consultation process is described in the Management System document submitted to the DOE for validation.

F.2. Summary of comments received

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N/A

F.3. Report on consideration of comments received

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N/A

SECTION G. Approval and authorization

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The Letter of Approval from Chile was not available at the time of submitting the PoA-DD to the validating DOE. The Letter of Approval for the PoA and authorization of the CME was thereafter issued by the Designated National Authority of Chile and is dated 27/07/2012.

PART II. Generic component project activity (CPA)

SECTION A. General description of a generic CPA

A.1. Purpose and general description of generic CPAs

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There is only one type of technology/measure eligible under the present PoA. Therefore the purpose and general description of each type of CPA coincides with the description in section A.6. of Part I above. However, there are two alternative eligible approaches of demonstrating additionality. Therefore, two separate types of CPAs are presented in this section. The only difference between them is the eligibility criterion relating to additionality, as one accepts FOIK projects and the other requires additionality demonstration based on financial indicators.

The present type of CPA is one that is the First of its Kind in its geographic region and shall adopt a non-renewable crediting period of 10 years.

SECTION B. Application of a baseline and monitoring methodology

B.1. Reference of the approved baseline and monitoring methodology(ies) selected

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The approved baseline and monitoring methodology applied to each CPA is the following:

ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", (Version 13.0.0) (the Methodology)[30]

It is applied in combination with the following tools:

- "Tool to calculate the emission factor for an electricity system" (Version 02.2.1), (the EF Tool)
- "Tool for the demonstration and assessment of additionality" (Version 06.0.0), (the Additionality Tool)

B.2. Application of methodology(ies)

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Justification of the choice of methodology:

Applicability conditions	Fulfillment of conditions
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 (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.	A CPA under the present PoA will consist of a solar power plant (greenfield plant) that delivers the energy generated to the national grid.
In the case of capacity additions, retrofits or replacements: the existing plant started commercial operation prior to 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	Not Applicable. A CPA does not involve capacity addition, retrofit or replacement of existing power plants.

[30] The Methodology and tools are available at http://cdm.unfccc.int/methodologies/PAmethodologies/approved . Last visited: 12/07/2012

implementation of the project activity.	
In case of hydro power plants: • The project activity is implemented in an existing simple or multiple reservoirs, with no change in the volume of any reservoirs; • The project activity is implemented in an existing simple or multiple reservoirs, where the volume of any of reservoirs is increased and the power density of each reservoir, as per definitions given in the Project Emissions section, is greater than 4 W/m^2; • The project activity results in new single or multiple reservoirs and the power density of each reservoir, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.	Not applicable. The project activity consists of a new solar photovoltaic power plant and has no hydropower components.
Non-applicability conditions	**Non Fulfillment of conditions**
Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site.	A CPA does not involve switching from fossil fuels to renewable energy sources since it is a new greenfield solar photovoltaic power plant connected to the grid.
Biomass fired power plants.	A CPA is a new solar photovoltaic power plant that has no biomass components.
A hydro power plant that result in new single reservoir or in the increase an single existing reservoir where the power density of the power plant is less than 4 W/m^2.	A CPA is a new solar photovoltaic power plant that has no hydropower component. Hence, no reservoirs are to result from the CPA.

Sampling plan:

As described in section B.6. of Part II of the PoA-DD, none of the variables used for the emission reduction calculations are derived through sampling. Therefore, no sampling plan is envisioned for the PoA.

B.3. Sources and GHGs

Table 2: Sources and gases included in the Project Boundary

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project scenario	For geothermal power plants, fugitive emissions of CH4 and CO2 from non-condensable gases contained in geothermal steam	CO_2	No	Not applicable to solar PV
		CH_4	No	Not applicable to solar PV
		N_2O	No	Not applicable to solar PV
	CO2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CO_2	No	Not applicable to solar PV
		CH_4	No	Not applicable to solar PV
		N_2O	No	Not applicable to solar PV
	For hydro power plants, emissions of CH4 from the reservoir	CO_2	No	Not applicable to solar PV
		CH_4	No	Not applicable to solar PV
		N_2O	No	Not applicable to solar PV

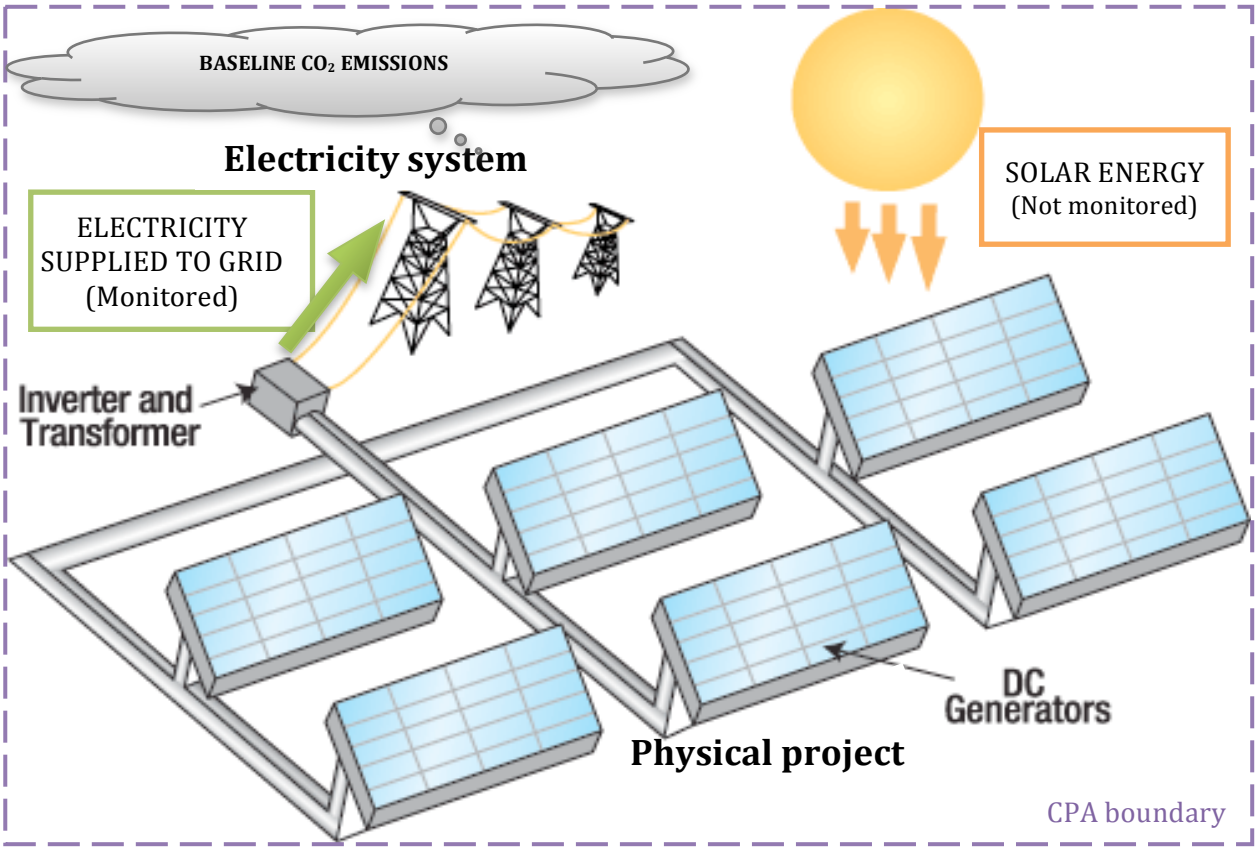

Figure 7: Flow diagram of a CPA

B.4. Description of baseline scenario

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Given that a CPA under the present PoA is a Greenfield project as per the PoA Eligibility Criteria, the baseline scenario as defined in the Methodology 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"."*

For a CPA, the baseline encompasses only that electricity system to which the CPA is to be physically connected and not all systems included in the PoA.

All electricity systems included in the Programme Boundary contain a significant percentage of fossil fuel-fired power plants in their generation matrix. A CPA thus displaces fossil fuel-based electricity with electricity from an abundant renewable source.

The identified baseline scenario is then the continuation of the current (previous) situation of electricity generation in the respective grid. The electricity that would be generated by the CPA would, in the absence of the CPA, be covered by the operation of power plants that are currently connected to that grid and by the addition of new generation sources, as reflected in the combined margin (CM) calculations.

The baseline emissions include only CO_2 emissions from electricity generation in fossil fuel-fired power plants and plants that use renewable resources, which are displaced due to the project activity.

B.5. Demonstration of eligibility for a generic CPA

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The compliance with the eligibility criteria defined in Part I of the present document is assessed for each potential CPA through the procedures described in the PoA Management system (as per the PoA Standard), which are submitted to the DOE for validation. For each CPA, they are further operationalized in the different sections of the CPA-DD, listed per eligibility criterion in the table below:

	Applicable PoA Standard requirement	Eligibility criterion	Section CPA-DD	Procedure PoA MS
1	The geographical boundary of the CPA including any time-induced boundary consistent with the geographical boundary set in the PoA	1. The geographical boundary of the CPA shall be within the borders of Chile and include all power plants connected to the specific regional electricity grid that the CPA is connected to.	A.3. A.7. D.3.	Location
2	Conditions that avoid double counting of emission reductions like unique identifications of product and end-user locations (e.g. programme logo)	2. The CPA implementer shall provide the CME the exact geographic reference of the location of the power plant. A CPA is only eligible if there is no other solar PV power plant registered as a CDM project or included in another PoA in the same location.	A.7. A.12.	Double Counting
3	The specifications of technology/ measure including the level and type of service, performance specifications including compliance with testing/ certifications;	3.1. As per the applicable methodology, the CPA shall consist in a Greenfield grid-connected solar photovoltaic power plant that generates electricity from solar energy and has an installed capacity of at least 100 kW.	A.5.	Due Diligence
		3.2. The CPA Implementer shall provide evidence that the equipment used in the project will comply with national/international standards or certifications.	D.5.	Legal
4	Conditions to check the start date of the CPA through documentary evidence	4. A CPA is only eligible if its starting date is after the starting date of the PoA. If the starting date of a CPA is in the future, this eligibility criterion shall be considered fulfilled. In order for Solarpack Chile S.A. to check the start date of the CPA, the CPA shall either be developed by Solarpack Chile S.A. or the CPA Implementer shall declare that: 1) all information available relevant to the timeline of construction and implementation of the project and real action related to it has been provided to the CME, *and* 2) any such relevant information will be disclosed as it becomes available.	A.8. D.5.	Starting Date

	Applicable PoA Standard requirement	Eligibility criterion	Section CPA-DD	Procedure PoA MS
5	Conditions that ensure compliance with applicability and other requirements of single or multiple methodologies applied by CPAs	5. As per the applicable methodology, the CPA shall install a new solar power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant).	A.5.	Baseline
6	The conditions that ensure that CPAs meet the requirements pertaining to the demonstration of additionality [...]	6.2: A CPA can be considered First-of-its-Kind in Chile as long as: 1) there is no ground-mounted grid-connected solar photovoltaic power plant that has started commercial operation in Chile before the submission of the CPA for inclusion, or before the starting date of the CPA, whichever is earlier; AND 2) the selected crediting period is 10 years, non-renewable.	A.9. D.5.	FOIK
7	The PoA-specific requirements stipulated by the CME including any conditions related to undertaking local stakeholder consultations and environmental impact analysis	7. A stakeholder consultation has been performed at the CPA level as specified in section F of the PoA-DD.	C	Stakeholder Consulta-tion
8		8. The CPA implementer shall provide the CME with proof of the compliance of the power plant with the Host Country's environmental regulations, as specified in section E of the PoA-DD.	B	EIA
9	Conditions to provide an affirmation that funding from Annex I parties, if any, does not result in a diversion of official development assistance	9. The CPA implementer shall provide the CME with an affirmation that funding from Annex I parties, if any, does not result in a diversion of official development assistance.	A.11.	ODA
10	Where applicable, target group (e.g. domestic/commercial/industrial, rural/urban, grid-connected/off-grid) and distribution mechanisms (e.g. direct installation)	10. CPAs shall constitute a grid-connected power plant.	A.5.	Due Diligence
14 [31]	Others	11. The CPA implementer shall declare that all mandatory legal and regulatory requirements at the time of the CPA inclusion and which might constitute any obligation to the CPA implementer will be complied with.	D.5.	Legal

[31] The requirements 11 through 13 are not applicable to CPAs under this PoA as demonstrated in section B.2. of Part I of the PoA-DD, and thus need not be considered in the CPA-DD.

B.6. Estimation of emission reductions of a generic CPA
B.6.1. Explanation of methodological choices
>>

Emission reductions:

According to equation 11 of the Methodology, the emission reductions of a CPA are to be estimated as follows:

$$ER_y = BE_y - PE_y \quad \textbf{(1)}$$

Where:

ER_y	Emission reductions in year *y* (t CO_2/yr)
BE_y	Baseline emissions in year *y* (t CO_2/yr)
PE_y	Project emissions in year *y* (t CO_2/yr)

However, in accordance with the Table 2: Sources and gases included in the Project Boundary, Project Emissions are considered 0 for a CPA. Therefore, emission reductions are technically equal to the baseline emission:

$$ER_y = BE_y - 0 = BE_y \quad \textbf{(2)}$$

Baseline emissions
According to equation (6) of the Methodology, the baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} \cdot EF_{grid,CM,y} \quad \textbf{(3)}$$

Where:

$EG_{PJ,y}$	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/yr)
$EF_{grid,CM,y}$	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" (tCO_2/MWh)

Electricity generation
A CPA under the present PoA is a greenfield project. Therefore, electricity generation is calculated according to case (a), Greenfield Projects of the respective section of the Methodology, using equation (7):

$$EG_{PJ,y} = EG_{facility,y} \quad \textbf{(4)}$$

Where:

$EG_{facility,y}$	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)

Emission Factor

The Emission Factor applied is the one calculated for the specific electricity grid that the CPA is connected to as prescribed in the Methodology and following the EF Tool.

The EF tool includes six steps to be applied in order to determine the combined margin emission factor:

STEP 1. Identify the relevant electricity systems;
STEP 2. Choose whether to include off-grid power plants in the project electricity system (optional);
STEP 3. Select a method to determine the operating margin (OM);
STEP 4. Calculate the operating margin emission factor according to the selected method;
STEP 5. Calculate the build margin (BM) emission factor;
STEP 6. Calculate the combined margin (CM) emission factor.

Step 1: Identify the relevant electric power system

Each CPA shall identify the relevant electric power system.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional);
For the calculation of the grid emission factor for all CPAs under this PoA, only grid-connected power plants will be considered (Option I). Off-grid power plants are ignored. Moreover, the power plants considered are only those connected to the specific electric power grid the CPA is physically connected to, and not to other regional grids existent in the country or region.

Step 3: Select a method to determine the operating margin (OM)

The OM is calculated using the ***ex ante*** **option.** As per the EF Tool, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. As all CPAs are grid power plants, a 3-year generation-weighted average shall be used, based on the most recent data available at the time of submission of the CPA-DD to the DOE for validation.

The method to be applied shall be chosen among the options presented in the EF Tool. In particular:

If the Low-Cost/Must Run power plants in the relevant system constitute less than 50% of installed capacity, (such as, for example in the SING in Chile) the CPA shall use the Simple OM method or the Average OM method.

If LC/MR power plants represent more than 50% of installed capacity (such as, for example, in the SIC in Chile), the CPA shall use the Simple Adjusted OM method or Average OM method.

Step 4: Calculate the operating margin emission factor according to the selected method
For a CPA, the calculation of the Operating Margin emission factor ($EF_{grid,OM,y}$) is done using Option (A), based on the net electricity generation and a CO2 emission factor of each power unit. The emission factor of each power unit is determined following either of the options A1, A2 or A3, (in this order, depending on the availability of fuel consumption and/or efficiency data).
If not enough data is available for the application of option A, option B can be chosen instead. This is allowed as

- Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
- Off-grid power plants are not included in the calculation (i.e. Option I has been chosen in Step 2).

The equations for each option are listed below.

Determination of the OM Emission Factor

Simple OM, Option A (equation 1 of the EF tool):

$$EF_{grid,OMsimple,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad \textbf{(5)}$$

Where:

$EF_{grid,OMsimple,y}$	Simple operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
$EG_{m,y}$	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 grid 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

Simple OM, Option B (equation 6 of the EF tool):

$$EF_{grid,OMsimple,y} = \frac{\sum_i (FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y})}{EG_y} \quad \textbf{(6)}$$

Where:

$EF_{grid,OMsimple,y}$	Simple operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
$FC_{i,y}$	Amount of fossil fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit)
$NCV_{i,y}$	Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,y}$	CO2 emission factor of fossil fuel type *i* in year *y* (tCO_2/GJ)
EG_y	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year *y* (MWh)
i	All fossil fuel types combusted in power sources in the project electricity system in year *y*
y	The relevant year as per the data vintage chosen in Step 3

Simple adjusted OM, option A (equation 7 of the EF tool):

$$EF_{grid,OM-adj,y} = (1 - \lambda_y) \cdot \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} + \lambda_y \cdot \frac{\sum_k EG_{k,y} \times EF_{EL,k,y}}{\sum_k EG_{k,y}} \quad \textbf{(7)}$$

Where:

$EF_{grid,OM-adj,y}$	Simple adjusted operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
λ_y	Factor expressing the percentage of time when low-cost/must-run power units are on the margin in year *y*
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EG_{k,y}$	Net quantity of electricity generated and delivered to the grid by power unit *k* in year *y* (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$EF_{EL,k,y}$	CO_2 emission factor of power unit *k* in year *y* (tCO_2/MWh)
m	All grid power units serving the grid in year *y* except low-cost/must-run power units
k	All low-cost/must run grid power units serving the grid in year *y*
y	The relevant year as per the data vintage chosen in Step 3

Determination of λ_y (equation 8 of the EF tool):

The parameter Lambda (λ_y) is defined as follows:

$$\lambda_y(\%) = \frac{Number\ of\ hours\ low{-}cost\ /must{-}run\ sources\ are\ on\ the\ margin\ in\ year\ y}{8760\ hours\ per\ year} \quad \textbf{(8)}$$

Calculation method:

Step (i) Plot a load duration curve. Collect chronological load data (typically in MW) for each hour of the year *y*, and sort the load data from the highest to the lowest MW level. Plot MW against 8760 hours in the year, in descending order.

Step (ii) Collect electricity generation data from each power plant/unit. Calculate the total annual generation (in MWh) from low-cost/must-run power plants/units (i.e. $\Sigma_k EG_{k,y}$).

Step (iii) Fill the load duration curve. Plot a horizontal line across the load duration curve such that the area under the curve (MW times hours) equals the total generation (in MWh) from low-cost/must-run power plants/units (i.e. $\Sigma_k EG_{k,y}$).

Step (iv) Determine the "Number of hours for which low-cost/must-run sources are on the margin in year y". First, locate the intersection of the horizontal line plotted in Step (iii) and the load duration curve plotted in Step (i). The number of hours (out of the total of 8760 hours) to the right of the intersection is the number of hours for which low-cost/must-run sources are on the margin. If the lines do not intersect, then one may conclude that low-cost/must-run sources do not appear on the margin and λy is equal to zero.

Average OM, options A and B:
Same as Simple OM, options A and B, but also including Low-Cost/Must-Run units in all equations.

Step 4.a: Determination of $EF_{EL,m,y}$:

Option A1: If for a power unit m data on fuel consumption and electricity generation is available, the emission factor should be determined as per equation (2) of the EF tool:

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_{m,y}} \quad \textbf{(9)}$$

Where:

$EF_{EL,m,y}$:	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$FC_{i,m,y}$:	Amount of fossil fuel type *i* consumed by power unit *m* in year *y* (Mass or volume unit)
$NCV_{i,y}$:	Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ / mass or volume unit)
$EF_{CO2,i,y}$:	CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/GJ)
$EG_{m,y}$:	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
m:	All power units serving the grid in year *y* except low-cost/must-run power units.
i:	All fossil fuel types combusted in power unit *m* in year *y*
y:	The relevant year as per the data vintage chosen in Step 3.

Option A2: If for a power unit *m* only data on electricity generation and the fuel types used is available, the emission factor should be determined based on the CO_2 emission factor of the fuel type used and the efficiency of the power unit, as per equation (3) of the EF tool:

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{m,y}} \quad \textit{(10)}$$

Where:

$EF_{EL,m,y}$	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$EF_{CO2,m,i,y}$	Average CO_2 emission factor of fuel type *i* used in power unit *m* in year *y* (tCO_2/GJ)
$\eta_{m,y}$	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 the data vintage chosen in Step 3.

Where several fuel types are used in the power unit, the fuel type with the lowest CO_2 emission factor for $EF_{CO2,m,i,y}$ will be used.

Option A3: If for a power unit *m* only data on electricity generation is available, an emission factor of 0 tCO_2/MWh can be assumed as a simple and conservative approach.

Step 4b: Determination of $EF_{EL,k,y}$

$EF_{EL,k,y}$ will be determined in the same manner as $EF_{EL,m,y}$ (option A1, A2, or A3).

Net electricity imports: At the time of submission of the present document, neither the SIC nor the SING are interconnected with other grids and thus there are no electricity imports. If in the future this situation changes, or for electricity systems that are interconnected, net electricity imports are to be considered as low-cost/must-run units *k*.

Step 5: Calculate the build margin (BM) emission factor

The BM emission factor will be calculated following **Option 1** of the EF tool:

> *For the first crediting period, calculate the build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.*

The sample group of power units *m* used to calculate the Build Margin will be determined as per the following procedure, consistent with the data vintage selected:

a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh);

b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20%

falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET-\geq 20\%}$, in MWh);

c) From $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample}); Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. Ignore steps (d), (e) and (f).

Otherwise:

d) Exclude from SET_{sample} the power units which started to supply electricity to the grid more than 10 years ago. Include in that set the power units registered as CDM project activity, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set ($SET_{sample\text{-}CDM}$) the annual electricity generation ($AEG_{SET\text{-}sample\text{-}CDM}$, in MWh);

If the annual electricity generation of that set is comprises at least 20% of the annual electricity generation of the project electricity system (i.e. $AEG_{SET\text{-}sample\text{-}CDM} \geq 0.2 \times AEG_{total}$), then use the sample group $SET_{sample\text{-}CDM}$ to calculate the build margin. Ignore steps (e) and (f).

Otherwise:

e) Include in the sample group $SET_{sample\text{-}CDM}$ the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);

f) The sample group of power units m used to calculate the build margin is the resulting set ($SET_{sample\text{-}CDM\text{->}10yrs}$).

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year *y* for which electricity generation data is available, calculated as per equation 12 of the EF Tool, as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad \textbf{(9)}$$

Where:

$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year *y* (tCO_2/MWh)
$EG_{m,y}$	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	Power units included in the build margin
y	Most recent historical year for which electricity generation data is available.

The CO_2 emission factor of each power unit *m* ($EF_{EL,m,y}$) should be determined as per the guidance in Step 4 (a) for the simple OM, using options A1, A2 or A3, using for *y* the most recent historical year for which electricity generation data is available, and using for *m* the power units included in the build margin.

If the power units included in the build margin *m* correspond to the sample group $SET_{sample\text{-}CDM\text{-}>10yrs}$, then, as a conservative approach, only option A2 from guidance in Step 4 (a) can be used and the default values provided in Annex 1 of the EF tool will be used to determine the parameter $\eta_{m,y}$.

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

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based preferably on the weighted average CM method, (Option A) and calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad \textbf{(10)}$$

Where:

$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year *y* (tCO_2/MWh)
$EF_{grid,OM\text{-}adj,y}$	Simple adjusted operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
w_{OM}	Weighting of operating margin emissions factor (%)
w_{BM}	Weighting of build margin emissions factor (%)

For all CPAs using the Weighted Average Combined Margin, the values of w_{OM} and w_{BM} will be fixed at 75% and 25% respectively for every crediting period, as prescribed for solar power projects by the EF tool.

Therefore, the calculation of the combined margin emission factor will in end effect be based on the following equation:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times 0.75 + EF_{grid,BM,y} \times 0.25 \quad \textbf{(11)}$$

If no information is available for the use of the weighted average CM, then a Simple CM method shall be applied, using an Average OM emission factor calculation (same as Equation 11, but w_{OM} and w_{BM} will be fixed at 1 and 0 respectively).

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

Depending on the data available the choice of equations following section B.6.1 above, a combination of the following parameters will be used to calculate the Combined Margin emission factor of the relevant electricity system. These parameters will not be monitored during the crediting period of a CPA.

In Chile there are currently four regional systems, as described in Part I above. Each of these systems differs according to:

- Transmission system operator (TSO)
- Types of data collected and published by the TSO
- Percentage of Low-Cost/Must-Run electricity generation
- Etc.

Moreover, depending on the vintage applied, the availability of data and information within the same system may also vary.

Hence, CPAs under this PoA are given different options for the calculation of the Combined Margin Grid Emission Factor. The variations in the calculation do not constitute an application of a different methodology or a different technology/measure implemented by the CPAs. Therefore, all these options are applicable under the same General CPA, i.e. electricity generation in a grid-connected solar photovoltaic power plant applying methodology ACM002, version 13.0.0.

(Copy this table for each data and parameter.)

Data / Parameter	$FC_{i,m,y}$, $FC_{i,y}$, $FC_{i,k,y}$
Unit	Mass or volume unit
Description	Amount of fossil fuel type *i* consumed by power plant / unit *m*, or *k* (or in the project electricity system in case of $FC_{i,y}$) in year *y*
Source of data	Utility or government records or official publications
Value(s) applied	To be specified by each CPA according to the applicable electricity system and the vintage of data used
Choice of data or Measurement methods and procedures	To be specified by each CPA
Purpose of data	Calculation of baseline emissions
Additional comment	

<table>
<tr><td>Data / Parameter</td><td>$NCV_{i,y}$</td></tr>
<tr><td>Unit</td><td>GJ/mass or volume unit</td></tr>
<tr><td>Description</td><td>Net calorific value (energy content) of fossil fuel type i in year y</td></tr>
<tr><td>Source of data</td><td>The following data sources may be used if the relevant conditions apply:
<table>
<tr><td>Data source</td><td>Conditions for using the data source</td></tr>
<tr><td>Values provided by the fuel supplier of the power plants in invoices</td><td>If data is collected from power plant operators (e.g. utilities)</td></tr>
<tr><td>Regional or national average default values</td><td>If values are reliable and documented in regional or national energy statistics / energy balances</td></tr>
<tr><td>IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories</td><td></td></tr>
</table></td></tr>
<tr><td>Value(s) applied</td><td>To be specified by each CPA according to the availability of data in the applicable electricity system and the vintage of data used</td></tr>
<tr><td>Choice of data or Measurement methods and procedures</td><td>To be specified by each CPA</td></tr>
<tr><td>Purpose of data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comment</td><td>The gross calorific value (GCV) of the fuel can be used, if gross calorific values are provided by the data sources used. Make sure that in such cases also a gross calorific value basis is used for CO_2 emission factor</td></tr>
</table>

Data / Parameter	$EF_{CO2,i,y}$ and $EF_{CO2,m,i,y}$
Unit	tCO_2/GJ
Description	CO_2 emission factor of fossil fuel type *i* used in power unit *m* in year *y*
Source of data	The following data sources may be used if the relevant conditions apply: Data source: Values provided by the fuel supplier of the power plants in invoices — Conditions for using the data source: If data is collected from power plant operators (e.g. utilities) Data source: Regional or national average default values — Conditions for using the data source: If values are reliable and documented in regional or national energy statistics / energy balances Data source: IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories — Conditions for using the data source:
Value(s) applied	To be specified by each CPA according to the availability of data in the applicable electricity system and the vintage of data used
Choice of data or Measurement methods and procedures	To be specified by each CPA
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$EG_{m,y}$, EG_y, and $EG_{k,y}$
Unit	MWh
Description	Net electricity generated by power plant/unit *m* or *k* (or in the project electricity system in case of EG_y) in year *y*
Source of data	Utility or government records or official publications
Value(s) applied	To be specified by each CPA according to the availability of data in the applicable electricity system and the vintage of data used
Choice of data or Measurement methods and procedures	To be specified by each CPA
Purpose of data	Calculation of baseline emissions
Additional comment	

Data / Parameter	$\eta_{m,y}$ and $\eta_{k,y}$
Unit	-
Description	Average net energy conversion efficiency of power unit *m* or *k* in year *y*
Source of data	Use either: • Documented manufacturer's specifications (if the efficiency of the plant is not significantly increased through retrofits or rehabilitations); or • For grid power plants: data from the utility, the dispatch center or official records if it can be deemed reliable; or • The default values provided in the table in Annex 1 of the EF Tool (if available for the type of power plant)
Value(s) applied	To be specified by each CPA according to the availability of data in the applicable electricity system and the vintage of data used
Choice of data or Measurement methods and procedures	To be specified by each CPA
Purpose of data	Calculation of baseline emissions
Additional comment	If the data obtained from the manufacturer, the utility, the dispatch center of official records is significantly lower than the default value provided in Annex 1 of the EF tool for the applicable technology, project proponents should assess the reliability of the values, and provide appropriate justification if deemed reliable. Otherwise, the default values provided in Annex 1 shall be used

B.6.3. Ex-ante calculations of emission reductions

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The ex-ante emission reduction calculations will be done in each specific CPA-DD on the basis of the equations in section B.6.1. above and the option chosen as per the EF tool during the process of inclusion of a CPA in the PoA.

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
(Copy this table for each data and parameter).

Data / Parameter	$EG_{facility,y}$
Unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y*
Source of data	Electricity meter(s)
Value(s) applied	To be determined by each CPA in its CPA-DD
Measurement methods and procedures	The following parameters shall be measured: (i) The quantity of electricity supplied by the project plant/unit to the grid; and (ii) The quantity of electricity delivered to the project plant/unit from the grid 100% of the data will be measured by an electricity meter. Measurements will be undertaken by the CPA implementer for each CPA using electricity meters certified to national or IEC standards. The data will be stored for a minimum of 2 years longer than the crediting period.
Monitoring frequency	Continuous measurement and at least monthly recording will be applied.
QA/QC procedures	As per the Methodology, all measurements should be conducted with calibrated measurement equipment according to relevant industry standards. If necessary, measurement results shall be cross-checked with records for sold/purchased electricity.
Purpose of data	Calculation of baseline emissions
Additional comments	-

B.7.2. Description of the monitoring plan for a generic CPA
>>
Electricity Generation Parameters:
The monitoring plan to be applied is based on the electricity supplied in MWh to the respective electricity grid (directly or through a transmission/distribution company) by the different CPAs. The collected and recorded data may be cross-checked with electricity sales invoices or other independent data, such as the measurements of the buyer of the electricity.

Each CPA will be equipped with electricity meters that will be maintained in accordance with the manufacturer specifications, national regulations, and/or industry standards. Before the installation of the meters, they should be factory calibrated by the manufacturer. Records of the meter (type, make, model and calibration date) will be retained in the electronic database of the PoA. As per the Methodology, the meters will be calibrated according to applicable industry standards.

For each CPA, the CPA implementer is responsible for continuously checking the operation of the metering equipment and for keeping records of the electricity delivered to the grid, as well as for archiving electricity sales invoices. The records will be archived electronically for the entire crediting period plus two years. At least once for every monitoring period the CPA implementer will submit an electronic copy of the operations records to the coordinating/managing entity. The CME will archive the operations records in an electronic database. The original records will be archived by the CPA implementer in electronic and/or paper form.

Training needs:

Collecting and monitoring the data are tasks that do not require intensive training since they coincide with the data that the income of a CPA is based on. Nevertheless, monitoring manuals, presented to the DOE for validation, will be available for the CPA implementers.

Quality Assurance and Quality Control procedures

The monitoring manuals will provide specific quality assurance and quality control (QA/QC) procedures for the parameters relevant for the specific stakeholders. As a minimum, separate monitoring manuals will be developed for the CME and for a CPA and for the CME. The monitoring manuals may then be elaborated in further detail as to adapt to the specific existing procedures of each CPA. The monitoring manuals may be adjusted to improve the QA/QC procedures and practices as more experience is gathered within the programme.

The monitoring manuals elaborated and provided to the DOE for validation include further information on responsibilities, management, quality assurance, means of verification of data, data transferring, and data trails. The procedures ensure that no double accounting occurs and that the status of verification can be determined anytime for each CPA.

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PART II. Generic component project activity (CPA)

SECTION A. General description of a generic CPA

A.1. Purpose and general description of generic CPAs

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There is only one type of technology/measure eligible under the present PoA. Therefore the purpose and general description of each type of CPA coincides with the description in section A.6. of Part I above. However, there are two alternative eligible approaches of demonstrating additionality. Therefore, two separate types of CPAs are presented in this section. The only difference between them is the eligibility criterion relating to additionality, as one accepts FOIK projects and the other requires additionality demonstration based on financial indicators.

The present type of CPA is one that uses financial indicators to demonstrate additionality. .

SECTION B. Application of a baseline and monitoring methodology

B.1. Reference of the approved baseline and monitoring methodology(ies) selected

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The approved baseline and monitoring methodology applied to each CPA is the following:

ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", (Version 13.0.0) (the Methodology)[32]

It is applied in combination with the following tools:

- "Tool to calculate the emission factor for an electricity system" (Version 02.2.1), (the EF Tool)
- "Tool for the demonstration and assessment of additionality" (Version 06.0.0), (the Additionality Tool)

B.2. Application of methodology(ies)

>>

Justification of the choice of methodology:

Applicability conditions	Fulfillment of conditions
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 (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.	A CPA under the present PoA will consist of a solar power plant (greenfield plant) that delivers the energy generated to the national grid.
In the case of capacity additions, retrofits or replacements: the existing plant started commercial operation prior to 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. A CPA does not involve capacity addition, retrofit or replacement of existing power plants.

[32] The Methodology and tools are available at http://cdm.unfccc.int/methodologies/PAmethodologies/approved . Last visited: 12/07/2012

In case of hydro power plants: • The project activity is implemented in an existing simple or multiple reservoirs, with no change in the volume of any reservoirs; • The project activity is implemented in an existing simple or multiple reservoirs, where the volume of any of reservoirs is increased and the power density of each reservoir, as per definitions given in the Project Emissions section, is greater than 4 W/m^2; • The project activity results in new single or multiple reservoirs and the power density of each reservoir, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.	Not applicable. The project activity consists of a new solar photovoltaic power plant and has no hydropower components.
Non-applicability conditions	**Non Fulfillment of conditions**
Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site.	A CPA does not involve switching from fossil fuels to renewable energy sources since it is a new greenfield solar photovoltaic power plant connected to the grid.
Biomass fired power plants.	A CPA is a new solar photovoltaic power plant that has no biomass components.
A hydro power plant that result in new single reservoir or in the increase an single existing reservoir where the power density of the power plant is less than 4 W/m^2.	A CPA is a new solar photovoltaic power plant that has no hydropower component. Hence, no reservoirs are to result from the CPA.

Sampling plan:

As described in section B.6. of Part II of the PoA-DD, none of the variables used for the emission reduction calculations are derived through sampling. Therefore, no sampling plan is envisioned for the PoA.

B.3. Sources and GHGs

Table 3: Sources and gases included in the Project Boundary

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project scenario	For geothermal power plants, fugitive emissions of CH4 and CO2 from non-condensable gases contained in geothermal steam	CO_2	No	Not applicable to solar PV
		CH_4	No	Not applicable to solar PV
		N_2O	No	Not applicable to solar PV
	CO2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CO_2	No	Not applicable to solar PV
		CH_4	No	Not applicable to solar PV
		N_2O	No	Not applicable to solar PV
	For hydro power plants, emissions of CH4 from the reservoir	CO_2	No	Not applicable to solar PV
		CH_4	No	Not applicable to solar PV
		N_2O	No	Not applicable to solar PV

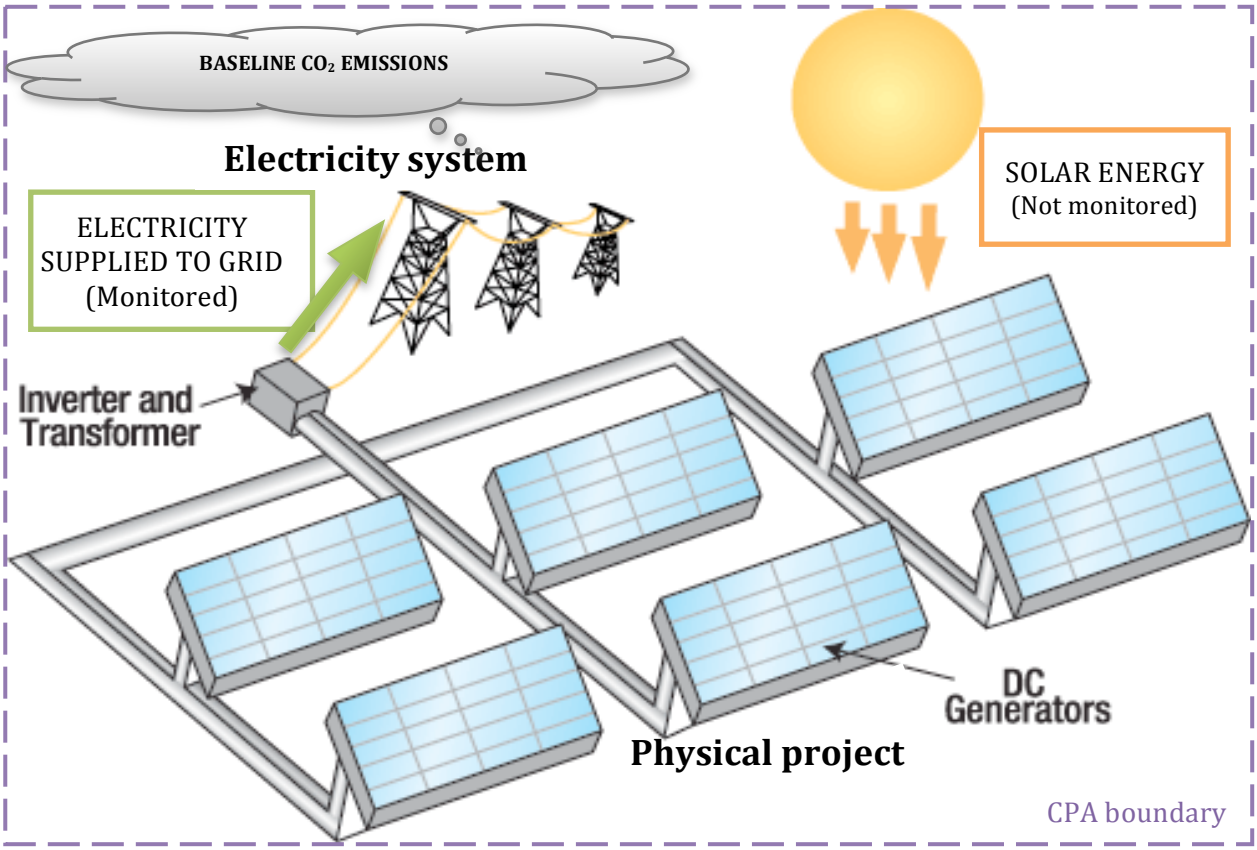

Figure 8: Flow diagram of a CPA

B.4. Description of baseline scenario

>>

Given that a CPA under the present PoA is a Greenfield project as per the PoA Eligibility Criteria, the baseline scenario as defined in the Methodology 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"."*

For a CPA, the baseline encompasses only that electricity system to which the CPA is to be physically connected and not all systems included in the PoA.

All electricity systems included in the Programme Boundary contain a significant percentage of fossil fuel-fired power plants in their generation matrix. A CPA thus displaces fossil fuel-based electricity with electricity from an abundant renewable source.

The identified baseline scenario is then the continuation of the current (previous) situation of electricity generation in the respective grid. The electricity that would be generated by the CPA would, in the absence of the CPA, be covered by the operation of power plants that are currently connected to that grid and by the addition of new generation sources, as reflected in the combined margin (CM) calculations.

The baseline emissions include only CO_2 emissions from electricity generation in fossil fuel-fired power plants and plants that use renewable resources, which are displaced due to the project activity.

B.5. Demonstration of eligibility for a generic CPA

>>

The compliance with the eligibility criteria defined in Part I of the present document is assessed for each potential CPA through the procedures described in the PoA Management system (as per the PoA Standard), which are submitted to the DOE for validation. For each CPA, they are further operationalized in the different sections of the CPA-DD, listed per eligibility criterion in the table below:

	Applicable PoA Standard requirement	Eligibility criterion	Section CPA-DD	Procedure PoA MS
1	The geographical boundary of the CPA including any time-induced boundary consistent with the geographical boundary set in the PoA	1. The geographical boundary of the CPA shall be within the borders of Chile and include all power plants connected to the specific regional electricity grid that the CPA is connected to.	A.3. A.7. D.3.	Location
2	Conditions that avoid double counting of emission reductions like unique identifications of product and end-user locations (e.g. programme logo)	2. The CPA implementer shall provide the CME the exact geographic reference of the location of the power plant. A CPA is only eligible if there is no other solar PV power plant registered as a CDM project or included in another PoA in the same location.	A.7. A.12.	Double Counting
3	The specifications of technology/ measure including the level and type of service, performance specifications including compliance with testing/ certifications;	3.1. As per the applicable methodology, the CPA shall consist in a Greenfield grid-connected solar photovoltaic power plant that generates electricity from solar energy and has an installed capacity of at least 100 kW.	A.5.	Due Diligence
		3.2. The CPA Implementer shall provide evidence that the equipment used in the project will comply with national/international standards or certifications.	D.5.	Legal
4	Conditions to check the start date of the CPA through documentary evidence	4. A CPA is only eligible if its starting date is after the starting date of the PoA. If the starting date of a CPA is in the future, this eligibility criterion shall be considered fulfilled. In order for Solarpack Chile S.A. to check the start date of the CPA, the CPA shall either be developed by Solarpack Chile S.A. or the CPA Implementer shall declare that: 3) all information available relevant to the timeline of construction and implementation of the project and real action related to it has been provided to the CME, *and* 4) any such relevant information will be disclosed as it becomes available.	A.8. D.5.	Starting Date

	Applicable PoA Standard requirement	Eligibility criterion	Section CPA-DD	Procedure PoA MS
5	Conditions that ensure compliance with applicability and other requirements of single or multiple methodologies applied by CPAs	5. As per the applicable methodology, the CPA shall install a new solar power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant).	A.5.	Baseline
6	The conditions that ensure that CPAs meet the requirements pertaining to the demonstration of additionality [...]	6.1: The proposed CPA shall have a combination of expected revenue per MWh (including any renewable energy premium), investment costs per MW, and load factor at the time of taking the investment decision or CPA inclusion (whichever occurs earlier), that is within the eligible ranges as per Appendix 3 of the PoA-DD	D.5.	Ranges
7	The PoA-specific requirements stipulated by the CME including any conditions related to undertaking local stakeholder consultations and environmental impact analysis	7. A stakeholder consultation has been performed at the CPA level as specified in section F of the PoA-DD.	C	Stakeholder Consulta-tion
8		8. The CPA implementer shall provide the CME with proof of the compliance of the power plant with the Host Country's environmental regulations, as specified in section E of the PoA-DD.	B	EIA
9	Conditions to provide an affirmation that funding from Annex I parties, if any, does not result in a diversion of official development assistance	9. The CPA implementer shall provide the CME with an affirmation that funding from Annex I parties, if any, does not result in a diversion of official development assistance.	A.11.	ODA
10	Where applicable, target group (e.g. domestic/commercial/industrial, rural/urban, grid-connected/off-grid) and distribution mechanisms (e.g. direct installation)	10. CPAs shall constitute a grid-connected power plant.	A.5.	Due Diligence
14 [33]	Others	11. The CPA implementer shall declare that all mandatory legal and regulatory requirements at the time of the CPA inclusion and which might constitute any obligation to the CPA implementer will be complied with.	D.5.	Legal

[33] The requirements 11 through 13 are not applicable to CPAs under this PoA as demonstrated in section B.2. of Part I of the PoA-DD, and thus need not be considered in the CPA-DD.

Demonstration of Eligibility Criterion 6.1.:

	Expected Value	Expected Value +/-10%	Combination eligible with expected value +/-10%?	Reference
Plant Load Factor				
Investment Cost per MW				
Revenues per MWh				

B.6. Estimation of emission reductions of a generic CPA
B.6.1. Explanation of methodological choices
>>

Emission reductions:

According to equation 11 of the Methodology, the emission reductions of a CPA are to be estimated as follows:

$$ER_y = BE_y - PE_y \quad \textbf{(1)}$$

Where:

ER_y	Emission reductions in year *y* (t CO_2/yr)
BE_y	Baseline emissions in year *y* (t CO_2/yr)
PE_y	Project emissions in year *y* (t CO_2/yr)

However, in accordance with the Table 2: Sources and gases included in the Project Boundary, Project Emissions are considered 0 for a CPA. Therefore, emission reductions are technically equal to the baseline emission:

$$ER_y = BE_y - 0 = BE_y \quad \textbf{(2)}$$

Baseline emissions
According to equation (6) of the Methodology, the baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} \cdot EF_{grid,CM,y} \quad \textbf{(3)}$$

Where:

$EG_{PJ,y}$	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/yr)
$EF_{grid,CM,y}$	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" (tCO_2/MWh)

Electricity generation

A CPA under the present PoA is a greenfield project. Therefore, electricity generation is calculated according to case (a), Greenfield Projects of the respective section of the Methodology, using equation (7):

$$EG_{PJ,y} = EG_{facility,y} \quad \textbf{(4)}$$

Where:

$EG_{facility,y}$	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

Emission Factor

The Emission Factor applied is the one calculated for the specific electricity grid that the CPA is connected to as prescribed in the Methodology and following the EF Tool.

The EF tool includes six steps to be applied in order to determine the combined margin emission factor:

STEP 1. Identify the relevant electricity systems;
STEP 2. Choose whether to include off-grid power plants in the project electricity system (optional);
STEP 3. Select a method to determine the operating margin (OM);
STEP 4. Calculate the operating margin emission factor according to the selected method;
STEP 5. Calculate the build margin (BM) emission factor;
STEP 6. Calculate the combined margin (CM) emission factor.

Step 1: Identify the relevant electric power system

Each CPA shall identify the relevant electric power system.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional);
For the calculation of the grid emission factor for all CPAs under this PoA, only grid-connected power plants will be considered (Option I). Off-grid power plants are ignored. Moreover, the power plants considered are only those connected to the specific electric power grid the CPA is physically connected to, and not to other regional grids existent in the country or region.

Step 3: Select a method to determine the operating margin (OM)

The OM is calculated using the ***ex ante*** **option.** As per the EF Tool, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. As all CPAs are grid power plants, a 3-year generation-weighted average shall be used, based on the most recent data available at the time of submission of the CPA-DD to the DOE for validation.

The method to be applied shall be chosen among the options presented in the EF Tool. In particular:

If the Low-Cost/Must Run power plants in the relevant system constitute less than 50% of installed capacity, (such as, for example in the SING in Chile) the CPA shall use the Simple OM method or the Average OM method.

If LC/MR power plants represent more than 50% of installed capacity (such as, for example, in the SIC in Chile), the CPA shall use the Simple Adjusted OM method or Average OM method.

Step 4: Calculate the operating margin emission factor according to the selected method
For a CPA, the calculation of the Operating Margin emission factor ($EF_{grid,OM,y}$) is done using Option (A), based on the net electricity generation and a CO2 emission factor of each power unit. The emission factor of each power unit is determined following either of the options A1, A2 or A3, (in this order, depending on the availability of fuel consumption and/or efficiency data).
If not enough data is available for the application of option A, option B can be chosen instead. This is allowed as

- Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
- Off-grid power plants are not included in the calculation (i.e. Option I has been chosen in Step 2).

The equations for each option are listed below.

Determination of the OM Emission Factor

Simple OM, Option A (equation 1 of the EF tool):

$$EF_{grid,OMsimple,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad \textbf{(5)}$$

Where:

$EF_{grid,OMsimple,y}$	Simple operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
$EG_{m,y}$	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 grid 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

Simple OM, Option B (equation 6 of the EF tool):

$$EF_{grid,OMsimple,y} = \frac{\sum_i (FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y})}{EG_y} \quad \textbf{(6)}$$

Where:

$EF_{grid,OMsimple,y}$	Simple operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
$FC_{i,y}$	Amount of fossil fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit)
$NCV_{i,y}$	Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,y}$	CO2 emission factor of fossil fuel type *i* in year *y* (tCO_2/GJ)
EG_y	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year *y* (MWh)
i	All fossil fuel types combusted in power sources in the project electricity system in year *y*
y	The relevant year as per the data vintage chosen in Step 3

Simple adjusted OM, option A (equation 7 of the EF tool):

$$EF_{grid,OM-adj,y} = (1 - \lambda_y) \cdot \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} + \lambda_y \cdot \frac{\sum_k EG_{k,y} \times EF_{EL,k,y}}{\sum_k EG_{k,y}} \quad \textbf{(7)}$$

Where:

$EF_{grid,OM-adj,y}$	Simple adjusted operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
λ_y	Factor expressing the percentage of time when low-cost/must-run power units are on the margin in year *y*
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EG_{k,y}$	Net quantity of electricity generated and delivered to the grid by power unit *k* in year *y* (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$EF_{EL,k,y}$	CO_2 emission factor of power unit *k* in year *y* (tCO_2/MWh)
m	All grid power units serving the grid in year *y* except low-cost/must-run power units
k	All low-cost/must run grid power units serving the grid in year *y*
y	The relevant year as per the data vintage chosen in Step 3

Determination of λ_y (equation 8 of the EF tool):

The parameter Lambda (λ_y) is defined as follows:

$$\lambda_y(\%) = \frac{Number\ of\ hours\ low{-}cost\ /must{-}run\ sources\ are\ on\ the\ margin\ in\ year\ y}{8760\ hours\ per\ year} \quad \textbf{(8)}$$

Calculation method:

Step (i) Plot a load duration curve. Collect chronological load data (typically in MW) for each hour of the year *y*, and sort the load data from the highest to the lowest MW level. Plot MW against 8760 hours in the year, in descending order.

Step (ii) Collect electricity generation data from each power plant/unit. Calculate the total annual generation (in MWh) from low-cost/must-run power plants/units (i.e. $\Sigma_k EG_{k,y}$).

Step (iii) Fill the load duration curve. Plot a horizontal line across the load duration curve such that the area under the curve (MW times hours) equals the total generation (in MWh) from low-cost/must-run power plants/units (i.e. $\Sigma_k EG_{k,y}$).

Step (iv) Determine the "Number of hours for which low-cost/must-run sources are on the margin in year y". First, locate the intersection of the horizontal line plotted in Step (iii) and the load duration curve plotted in Step (i). The number of hours (out of the total of 8760 hours) to the right of the intersection is the number of hours for which low-cost/must-run sources are on the margin. If the lines do not intersect, then one may conclude that low-cost/must-run sources do not appear on the margin and λy is equal to zero.

Average OM, options A and B:
Same as Simple OM, options A and B, but also including Low-Cost/Must-Run units in all equations.

Step 4.a: Determination of $EF_{EL,m,y}$:

Option A1: If for a power unit m data on fuel consumption and electricity generation is available, the emission factor should be determined as per equation (2) of the EF tool:

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_{m,y}} \quad \textbf{(9)}$$

Where:

$EF_{EL,m,y}$:	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$FC_{i,m,y}$:	Amount of fossil fuel type *i* consumed by power unit *m* in year *y* (Mass or volume unit)
$NCV_{i,y}$:	Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ / mass or volume unit)
$EF_{CO2,i,y}$:	CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/GJ)
$EG_{m,y}$:	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
m:	All power units serving the grid in year *y* except low-cost/must-run power units.
i:	All fossil fuel types combusted in power unit *m* in year *y*
y:	The relevant year as per the data vintage chosen in Step 3.

Option A2: If for a power unit *m* only data on electricity generation and the fuel types used is available, the emission factor should be determined based on the CO_2 emission factor of the fuel type used and the efficiency of the power unit, as per equation (3) of the EF tool:

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{m,y}} \quad \textit{(10)}$$

Where:

$EF_{EL,m,y}$	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$EF_{CO2,m,i,y}$	Average CO_2 emission factor of fuel type *i* used in power unit *m* in year *y* (tCO_2/GJ)
$\eta_{m,y}$	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 the data vintage chosen in Step 3.

Where several fuel types are used in the power unit, the fuel type with the lowest CO_2 emission factor for $EF_{CO2,m,i,y}$ will be used.

Option A3: If for a power unit *m* only data on electricity generation is available, an emission factor of 0 tCO_2/MWh can be assumed as a simple and conservative approach.

Step 4b: Determination of $EF_{EL,k,y}$

$EF_{EL,k,y}$ will be determined in the same manner as $EF_{EL,m,y}$ (option A1, A2, or A3).

Net electricity imports: At the time of submission of the present document, neither the SIC nor the SING are interconnected with other grids and thus there are no electricity imports. If in the future this situation changes, or for electricity systems that are interconnected, net electricity imports are to be considered as low-cost/must-run units *k*.

Step 5: Calculate the build margin (BM) emission factor

The BM emission factor will be calculated following **Option 1** of the EF tool:

> *For the first crediting period, calculate the build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.*

The sample group of power units *m* used to calculate the Build Margin will be determined as per the following procedure, consistent with the data vintage selected:

g) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh);

h) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20%

falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET-\geq 20\%}$, in MWh);

i) From $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample}); Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. Ignore steps (d), (e) and (f).

Otherwise:

j) Exclude from SET_{sample} the power units which started to supply electricity to the grid more than 10 years ago. Include in that set the power units registered as CDM project activity, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set ($SET_{sample\text{-}CDM}$) the annual electricity generation ($AEG_{SET\text{-}sample\text{-}CDM}$, in MWh);

If the annual electricity generation of that set is comprises at least 20% of the annual electricity generation of the project electricity system (i.e. $AEG_{SET\text{-}sample\text{-}CDM} \geq 0.2 \times AEG_{total}$), then use the sample group $SET_{sample\text{-}CDM}$ to calculate the build margin. Ignore steps (e) and (f).

Otherwise:

k) Include in the sample group $SET_{sample\text{-}CDM}$ the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);

l) The sample group of power units m used to calculate the build margin is the resulting set ($SET_{sample\text{-}CDM\text{->}10yrs}$).

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year *y* for which electricity generation data is available, calculated as per equation 12 of the EF Tool, as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad \textbf{(9)}$$

Where:

$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year *y* (tCO_2/MWh)
$EG_{m,y}$	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	Power units included in the build margin
y	Most recent historical year for which electricity generation data is available.

The CO_2 emission factor of each power unit *m* ($EF_{EL,m,y}$) should be determined as per the guidance in Step 4 (a) for the simple OM, using options A1, A2 or A3, using for *y* the most recent historical year for which electricity generation data is available, and using for *m* the power units included in the build margin.

If the power units included in the build margin *m* correspond to the sample group $SET_{sample\text{-}CDM\text{-}>10yrs}$, then, as a conservative approach, only option A2 from guidance in Step 4 (a) can be used and the default values provided in Annex 1 of the EF tool will be used to determine the parameter $\eta_{m,y}$.

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

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based preferably on the weighted average CM method, (Option A) and calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad \textbf{(10)}$$

Where:

$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year *y* (tCO_2/MWh)
$EF_{grid,OM\text{-}adj,y}$	Simple adjusted operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
w_{OM}	Weighting of operating margin emissions factor (%)
w_{BM}	Weighting of build margin emissions factor (%)

For all CPAs using the Weighted Average Combined Margin, the values of w_{OM} and w_{BM} will be fixed at 75% and 25% respectively for every crediting period, as prescribed for solar power projects by the EF tool.

Therefore, the calculation of the combined margin emission factor will in end effect be based on the following equation:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times 0.75 + EF_{grid,BM,y} \times 0.25 \quad \textbf{(11)}$$

If no information is available for the use of the weighted average CM, then a Simple CM method shall be applied, using an Average OM emission factor calculation (same as Equation 11, but w_{OM} and w_{BM} will be fixed at 1 and 0 respectively).

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

Depending on the data available the choice of equations following section B.6.1 above, a combination of the following parameters will be used to calculate the Combined Margin emission factor of the relevant electricity system. These parameters will not be monitored during the crediting period of a CPA.

In Chile there are currently four regional systems, as described in Part I above. Each of these systems differs according to:

- Transmission system operator (TSO)
- Types of data collected and published by the TSO
- Percentage of Low-Cost/Must-Run electricity generation
- Etc.

Moreover, depending on the vintage applied, the availability of data and information within the same system may also vary.

Hence, CPAs under this PoA are given different options for the calculation of the Combined Margin Grid Emission Factor. The variations in the calculation do not constitute an application of a different methodology or a different technology/measure implemented by the CPAs. Therefore, all these options are applicable under the same General CPA, i.e. electricity generation in a grid-connected solar photovoltaic power plant applying methodology ACM002, version 13.0.0.

(Copy this table for each data and parameter.)

Data / Parameter	$FC_{i,m,y}$, $FC_{i,y}$, $FC_{i,k,y}$
Unit	Mass or volume unit
Description	Amount of fossil fuel type *i* consumed by power plant / unit *m*, or *k* (or in the project electricity system in case of $FC_{i,y}$) in year *y*
Source of data	Utility or government records or official publications
Value(s) applied	To be specified by each CPA according to the applicable electricity system and the vintage of data used
Choice of data or Measurement methods and procedures	To be specified by each CPA
Purpose of data	Calculation of baseline emissions
Additional comment	

<table>
<tr><td>Data / Parameter</td><td>$NCV_{i,y}$</td></tr>
<tr><td>Unit</td><td>GJ/mass or volume unit</td></tr>
<tr><td>Description</td><td>Net calorific value (energy content) of fossil fuel type i in year y</td></tr>
<tr><td>Source of data</td><td>The following data sources may be used if the relevant conditions apply:
<table>
<tr><td>Data source</td><td>Conditions for using the data source</td></tr>
<tr><td>Values provided by the fuel supplier of the power plants in invoices</td><td>If data is collected from power plant operators (e.g. utilities)</td></tr>
<tr><td>Regional or national average default values</td><td>If values are reliable and documented in regional or national energy statistics / energy balances</td></tr>
<tr><td>IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories</td><td></td></tr>
</table></td></tr>
<tr><td>Value(s) applied</td><td>To be specified by each CPA according to the availability of data in the applicable electricity system and the vintage of data used</td></tr>
<tr><td>Choice of data or Measurement methods and procedures</td><td>To be specified by each CPA</td></tr>
<tr><td>Purpose of data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comment</td><td>The gross calorific value (GCV) of the fuel can be used, if gross calorific values are provided by the data sources used. Make sure that in such cases also a gross calorific value basis is used for CO_2 emission factor</td></tr>
</table>

Data / Parameter	$EF_{CO2,i,y}$ and $EF_{CO2,m,i,y}$
Unit	tCO_2/GJ
Description	CO_2 emission factor of fossil fuel type *i* used in power unit *m* in year *y*
Source of data	The following data sources may be used if the relevant conditions apply: Data source: Values provided by the fuel supplier of the power plants in invoices — Conditions for using the data source: If data is collected from power plant operators (e.g. utilities) Data source: Regional or national average default values — Conditions for using the data source: If values are reliable and documented in regional or national energy statistics / energy balances Data source: IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories — Conditions for using the data source:
Value(s) applied	To be specified by each CPA according to the availability of data in the applicable electricity system and the vintage of data used
Choice of data or Measurement methods and procedures	To be specified by each CPA
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$EG_{m,y}$, EG_y, and $EG_{k,y}$
Unit	MWh
Description	Net electricity generated by power plant/unit *m* or *k* (or in the project electricity system in case of EG_y) in year *y*
Source of data	Utility or government records or official publications
Value(s) applied	To be specified by each CPA according to the availability of data in the applicable electricity system and the vintage of data used
Choice of data or Measurement methods and procedures	To be specified by each CPA
Purpose of data	Calculation of baseline emissions
Additional comment	

Data / Parameter	$\eta_{m,y}$ and $\eta_{k,y}$
Unit	-
Description	Average net energy conversion efficiency of power unit *m* or *k* in year *y*
Source of data	Use either: • Documented manufacturer's specifications (if the efficiency of the plant is not significantly increased through retrofits or rehabilitations); or • For grid power plants: data from the utility, the dispatch center or official records if it can be deemed reliable; or • The default values provided in the table in Annex 1 of the EF Tool (if available for the type of power plant)
Value(s) applied	To be specified by each CPA according to the availability of data in the applicable electricity system and the vintage of data used
Choice of data or Measurement methods and procedures	To be specified by each CPA
Purpose of data	Calculation of baseline emissions
Additional comment	If the data obtained from the manufacturer, the utility, the dispatch center of official records is significantly lower than the default value provided in Annex 1 of the EF tool for the applicable technology, project proponents should assess the reliability of the values, and provide appropriate justification if deemed reliable. Otherwise, the default values provided in Annex 1 shall be used

B.6.3. Ex-ante calculations of emission reductions

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The ex-ante emission reduction calculations will be done in each specific CPA-DD on the basis of the equations in section B.6.1. above and the option chosen as per the EF tool during the process of inclusion of a CPA in the PoA.

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
(Copy this table for each data and parameter).

Data / Parameter	$EG_{facility,y}$
Unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y*
Source of data	Electricity meter(s)
Value(s) applied	To be determined by each CPA in its CPA-DD
Measurement methods and procedures	The following parameters shall be measured: (iii) The quantity of electricity supplied by the project plant/unit to the grid; and (iv) The quantity of electricity delivered to the project plant/unit from the grid 100% of the data will be measured by an electricity meter. Measurements will be undertaken by the CPA implementer for each CPA using electricity meters certified to national or IEC standards. The data will be stored for a minimum of 2 years longer than the crediting period.
Monitoring frequency	Continuous measurement and at least monthly recording will be applied.
QA/QC procedures	As per the Methodology, all measurements should be conducted with calibrated measurement equipment according to relevant industry standards. If necessary, measurement results shall be cross-checked with records for sold/purchased electricity.
Purpose of data	Calculation of baseline emissions
Additional comments	-

B.7.2. Description of the monitoring plan for a generic CPA
>>
Electricity Generation Parameters:
The monitoring plan to be applied is based on the electricity supplied in MWh to the respective electricity grid (directly or through a transmission/distribution company) by the different CPAs. The collected and recorded data may be cross-checked with electricity sales invoices or other independent data, such as the measurements of the buyer of the electricity.

Each CPA will be equipped with electricity meters that will be maintained in accordance with the manufacturer specifications, national regulations, and/or industry standards. Before the installation of the meters, they should be factory calibrated by the manufacturer. Records of the meter (type, make, model and calibration date) will be retained in the electronic database of the PoA. As per the Methodology, the meters will be calibrated according to applicable industry standards.

For each CPA, the CPA implementer is responsible for continuously checking the operation of the metering equipment and for keeping records of the electricity delivered to the grid, as well as for archiving electricity sales invoices. The records will be archived electronically for the entire crediting period plus two years. At least once for every monitoring period the CPA implementer will submit an electronic copy of the operations records to the coordinating/managing entity. The CME will archive the operations records in an electronic database. The original records will be archived by the CPA implementer in electronic and/or paper form.

Training needs:
Collecting and monitoring the data are tasks that do not require intensive training since they coincide with the data that the income of a CPA is based on. Nevertheless, monitoring manuals, presented to the DOE for validation, will be available for the CPA implementers.

Quality Assurance and Quality Control procedures
The monitoring manuals will provide specific quality assurance and quality control (QA/QC) procedures for the parameters relevant for the specific stakeholders. As a minimum, separate monitoring manuals will be developed for the CME and for a CPA and for the CME. The monitoring manuals may then be elaborated in further detail as to adapt to the specific existing procedures of each CPA. The monitoring manuals may be adjusted to improve the QA/QC procedures and practices as more experience is gathered within the programme.

The monitoring manuals elaborated and provided to the DOE for validation include further information on responsibilities, management, quality assurance, means of verification of data, data transferring, and data trails. The procedures ensure that no double accounting occurs and that the status of verification can be determined anytime for each CPA.

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

Organization	Solarpack Chile S.A.
Street/P.O. Box	Estoril 50, office 1013
Building	
City	Las Condes, Santiago
State/Region	Metropolitan Region
Postcode	7591047
Country	Chile
Telephone	+56 236 90 426
Fax	+34 944 30 92 09
E-mail	info@solarpack.cl
Website	www.solarpack.cl
Contact person	Javier Arellano
Title	Director
Salutation	Mr.
Last name	Arellano
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First name	Javier
Department	
Mobile	+56985020911
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Direct tel.	
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Appendix 2: Affirmation regarding public funding

See section A7, Part I

Appendix 3: Application of methodology(ies)

Determination of Eligibility Criteria:

Eligibility Criterion 6.1.

The tables containing the eligible ranges of Investment Cost, Revenue and PLF, described in section B.1. of Part I above have been created on the basis of a generic financial model. Each table is calculated for a specific level of Plant Load Factor (e.g. 0.32<PLF≤0.33). The tables present the resulting pre-tax, project IRR in real terms based on each of the combinations of revenues and investment cost for this level of PLF. The cells marked in green are those that represent the eligible range of values. Those marked in red represent the non-eligible range of values.

The procedure for applying Eligibility Criterion 6.1. to a proposed CPA consists in the following:

1. Determine the expected Investment Cost per MW, PLF and Revenues per MWh at the time of taking the investment decision, or the time of submission for inclusion, whichever is earlier, following the latest version of the Guidelines on the Assessment of Investment Analysis.
2. Vary the expected Investment Cost by -10% and present the result in the CPA-DD. Find the combination of that value and the expected PLF and Revenue in the respective table and establish the eligibility of the combination.
3. Vary the expected PLF by +10% and present the result in the CPA-DD. Find the combination of that value and the expected Investment Cost and Revenue in the respective table and establish the eligibility of the combination.
4. Vary the expected Revenue by +10% and present the result in the CPA-DD. Find the combination of that value and the expected Investment Cost and Revenue in the respective table and establish the eligibility of the combination.
5. To find the combination of values in cases when a value is not represented, always use the closest more conservative value available. For example, if the Plant Load Factor of the CPA is 0.321, consider the table for PLF between 0.32 and 0.33, which is calculated on the basis of a PLF of 0.33. If the revenues per MWh of the CPA are 97.6, use the value of 100 in the tables as the more conservative alternative. If the CPA investment per MW is 3,899,000, use the value of 3,800,000 in the tables as the more conservative alternative.

The tables containing the eligible ranges of Investment Cost, Revenue and PLF are attached in a separate document.

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

Ex-ante calculation of emission reductions is done separately for each CPA.

Appendix 5: Further background information on the monitoring plan

The monitoring plan is described in section B.7.2., Part II above for each type of CPA. The monitoring plan for both CPA types is identical.

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History of the document

Version	Date	Nature of revision(s)
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the programme design document form for CDM programmes of activities" (EB 66, Annex 12).
01	EB33, Annex 41 27 July 2007	Initial adoption.
Decision Class: Regulatory **Document Type:** Form **Business Function:** Registration		