PROGRAMME DESIGN DOCUMENT FORM FOR SMALL-SCALE CDM PROGRAMMES OF ACTIVITIES (F-CDM-SSC-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

>>
Advanced Energy Solutions for Buildings. Programme of Activities (PoA)

Version 07
Date: 29/12/2013

A.2. Purpose and general description of the PoA

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The CDM Programme of activities "Advanced Energy Solutions for Buildings. Programme of Activities (PoA)" (hereinafter referred to as the PoA) involves the installation of fossil fuel based co-generation and trigeneration systems in order to supply electricity, cooling and/or heating in a less Greenhouse Gas intensive manner in non-industrial buildings in the following host countries:

1. Kingdom of Saudi Arabia
2. Oman
3. Egypt

The descriptions of PoA as follows;

1. Policy/measure or stated goal that the PoA seeks to promote;

The goal of the PoA is to provide electricity and meet the cooling and heat requirements of non industrial buildings in a more efficient and less carbon intensive way.

2. Framework for the implementation of the proposed PoA;

The PoA is implemented and operated by CES Carbon Services Ltd who will act as the Coordinating and Managing Entity (CME) of the PoA. CES Carbon Services Ltd will be responsible for ensuring that the following tasks are carried out under the PoA.

- Assess whether a potential CPA meets the eligibility criteria to be included in the PoA;
- Develop the relevant CPA documentation;
- Design the CPA Monitoring and Reporting plan;
- Train the CPA implementer's staff to ensure that the corresponding CPA DD Monitoring and Reporting Plan is followed;
- Manage the CPA inclusion Process;
- Contracting the DOE for validation;
- Set up monitoring and data collection systems;
- Provision of technical support to CPA implementers;
- Prepare monitoring reports for submission to DOE;

- Contracting the DOE for verification; and
- Ongoing review of the previous tasks.

CPAs will be implemented mainly by any of the following entities:

- Total Energy Solutions (TES), a Joint Venture between Al Aman, a local Saudi Arabian company and CES Energy Ireland;
- Energy Solutions Developers and Managers (ESDM), a Joint Venture between CES Energy Ireland and the Saudi Binladin Group, a leading construction firm in the Middle East; and
- CES Carbon Services Ltd.

The SSC CPAs may be implemented under business models whereby the project implementer, eg an Energy Services Company (ESCO) or technology promoter, invests in the project and obtains a return on its investment by selling the electricity, cooling and heat to the consumers or under EPC (Engineering Procurement and Construction) contractual arrangements whereby the owner or entity responsible for the provision of a buildings energy needs incurs in the investment.

The CME also offers the above services and support to any other potential project developers, regardless of who the project implementer may be and how it goes about implementing the project, eg:

- A construction company that is willing to consider installing a trigeneration system instead of a conventional system in a new building, to provide energy to new consumers

- The operator or owner of an existing building who might be willing to consider investing in retrofitting a trigeneration system to such building and meet the energy needs of existing consumers

- The operator or owner of an existing building that plans to install a new, though conventional system but would be willing to consider the installation of a more efficient, and less GHG intensive trigeneration alternative instead, if it can be shown to be more attractive to him.

3. Confirmation that the PoA is voluntary action by the CME

The PoA is a voluntary initiative led by CES Carbon Services Ltd. There are no mandatory laws or regulations in the host countries in which the SSC CPA are to be implemented, that require that the energy and utilities requirements in non industrial buildings be met by cogeneration or trigeneration systems.

4. Description of how the proposed PoA contributes to sustainable development

Diversification of and conservation of energy sources

- The PoA introduces more efficient forms of meeting electrical power, space cooling and hot water needs in commercial and institutional buildings.

- Cooling loads in buildings in the host countries covered by the PoA are large, and constitute the single most important energy load[1]. The PoA aims to introduce energy solutions that involve chilled water production solutions that rely on waste heat as the source of energy to drive them.

[1] Communication from engineering consulting firm, Mohammed A. Turki Mott MacDonald - MTMM Engineering Consultancy, Jeddah 21423 Kingdom of Saudi Arabia

The application of such technologies reduces the amount of energy that would have otherwise have had to been used to meet the building's space cooling needs, thus saving fossil fuels that would have otherwise have had to been consumed to generate such energy.

- Similarly, the utilization of waste heat resulting from the production of electricity also saves electricity that would have otherwise had to have been used to produce hot water.

Hence, the measures implemented under the PoA contribute to the diversification of energy sources and help conserve energy for future generations.

Economic sustainability

- Each SSC CPA that is implemented will contribute to the employment by providing opportunity of new jobs for local community starting from construction to commissioning, and thereafter throughout the ongoing operation and maintenance of the highly advanced building energy solution.

  The SSC CPAs to be implemented under the PoA are optimized energy solutions that require highly trained staff to operate and maintain them. CES Carbon Services Ltd will ensure that staffs involved in the operation of such installations receive the necessary training to perform their duties.

- Each SSC CPA will act as a clean technology showcase and should serve to encourage building designers, constructors, owners and operators to consider such schemes as a means of meeting a building's energy requirements in a more efficient and less carbon intensive manner.

Social Sustainability

- The PoA will implement advanced energy solutions, which will be operated and maintained to ensure the safe operation of such installations. SSC CPAs will create jobs and will serve as examples of advanced efficient technological solutions, which can be replicated in other parts of the country. The SSC CPAs serve as a means to foster a greater understanding of the practical aspects surrounding the operation of advanced energy, cooling and heating building solutions under local conditions.

Environmental sustainability

- The PoA introduces less greenhouse gas intensive forms of meeting electrical power, space cooling and hotwater needs in commercial and institutional buildings. The measures to be implemented under the PoA reduce the amount of power drawn from the grid or/and captive fossil fuel fired systems and thus reduce the amount of GHG emissions, as well as other pollutants resulting from the combustion of the fossil fuel which would have otherwise been used.

- Cooling loads in buildings in the countries covered by the PoA, are very large, and constitute the single most important energy load. The PoA aims to introduce lower carbon chilled water production solutions. The application of such technologies reduces the amount of energy that would have otherwise have had to been used to meet the building's space cooling needs.

- Similarly, the utilization of waste heat in the proposed systems also saves electricity or fossil fuel that would have otherwise had to be used to produce hot water. Hence, the measures implemented under the PoA reduce the GHG emissions and that of other pollutants generated by the

combustion of fossil fuels that would have otherwise have had to been used.

Technological sustainability

- The PoA contributes to increasing the awareness to the benefits that result from the implementation of high efficiency and low carbon building energy solutions and enables the capabilities and skills that are required to operate and maintain such system at high levels of performance to be developed. Hence the PoA enables the dissemination of efficient and low carbon technologies and the transfer of knowledge in how such systems are designed, operated and maintained. Each SSC CPA will provide an opportunity for local people to acquire know-how for the optimal maintenance and operation of state-of-the-art buildings facilities systems.

Therefore the PoA supports technology/know-how transfer from other Annex I countries, e.g. Germany, Switzerland, Ireland and others, thru the use of technology and via the training and practical work experience which result from the implementation of the SSC CPAs

A.3. CMEs and participants of PoA
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The Coordinating and Managing Entity (CME) for this POA is CES Carbon Services Ltd.

1. CES Carbon Services Ltd will be the entity that communicates with the CDM Executive Board.
2. Project participants being registered in relation to the PoA:

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)
Kingdom of Saudi Arabia (host)	CES Carbon Services Ltd (Private Entity)	No
Oman (host)	CES Carbon Services Ltd (Private Entity)	No
Egypt (host)	CES Carbon Services Ltd (Private Entity)	No
Republic of Ireland	CES Carbon Services Ltd (Private Entity)	A.4.1. No

A.5. Physical/ Geographical boundary of the PoA
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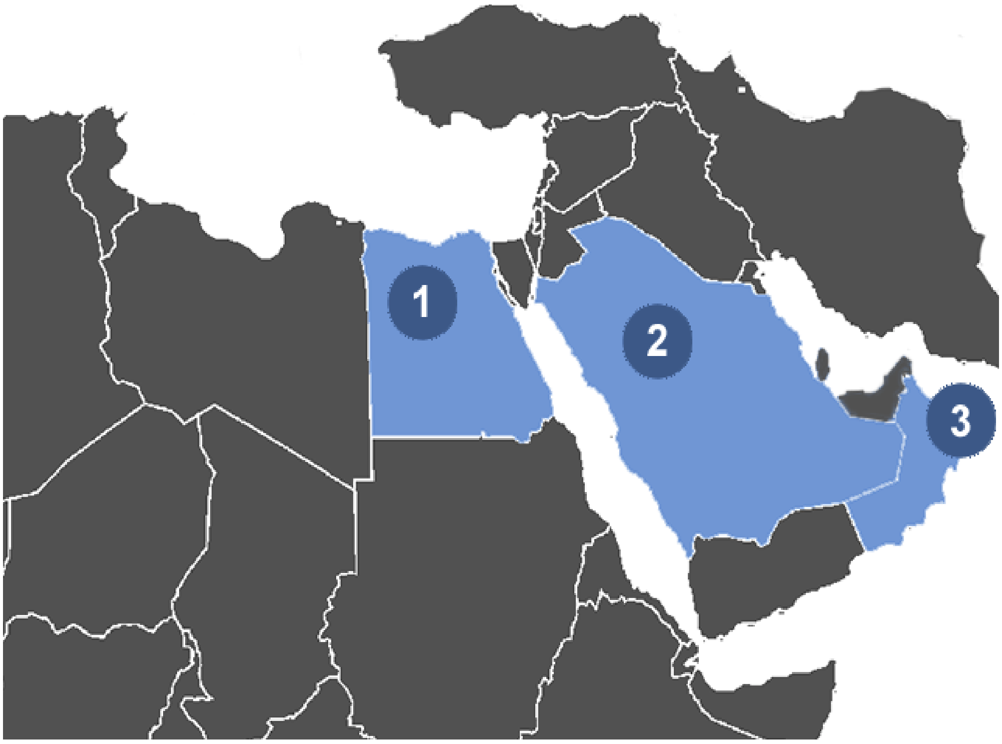
All CPAs included in the POA will be implemented within the geographical boundaries of the following countries:

- Kingdom of Saudi Arabia.
- Oman
- Egypt

The boundary of the PoA shall be amended post registration of the PoA to include other countries subject to the conditions presented in paragraph 25 of Annex 5, EB 70 being fulfilled.

A map indicating the geographical boundary of the PoA is provided below.

Figure 1: The map showing the countries that are within geographical boundary of the PoA



Countries: 1. Egypt; 2. Saudi Arabia; 3. Oman;

A.6. Technologies/measures

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The SSC PoA aims to introduce Trigeneration and Cogeneration schemes in non-industrial buildings, such as shopping malls, university campuses, hospitals, data centres, etc.

Cogeneration in the context of this PoA involves the simultaneous production of electricity and cooling or heating. It makes use of the waste heat, produced from the engines as a result of the generation of electricity, to provide for the heating requirements needed to run absorption chillers or meet heating loads. With conventional forms of electricity production, the waste heat would have been otherwise released or wasted. Similarly, tri-generation involves the simultaneous production of three commercial building energy requirements: Electricity, Cooling and Heating (Hot Water/steam). The waste heat produced from electricity generation in this case is used up to meet both the cooling and any heating requirements that a building may have.

With conventional electricity generation, only about 33% of the potential contained in the fuel is converted on average to electricity, while the remainder is lost as waste heat. Utilization of this waste heat

by cogeneration and tri-generation technologies helps achieve energy efficiencies of up to 90%[2]. In addition, the chillers that are part of the tri-generation system in the PoA will provide even more energy efficient forms for meeting the cooling requirements of a building.

A Typical tri-generation scheme consists of a CHP system and chillers. The power generation equipment may consist of fossil fuel fired Internal Combustion (IC) engines or turbines.

Waste heat obtained from the power plant, will be used as a source of heat to run absorption chillers, which produce chilled water used to meet a building's demand for space cooling. A portion of the waste heat from the engines is also recovered and used as a source of heat to produce hot water, or even steam. New high efficiency electric and non ODP chillers may also form part of trigeneration or cogeneration schemes in cases where they are an integral part of such systems's design or where they are to be used as backup.
Waste heat from the trigeneration system's power plant may also be used to generate additional electricity in an Organic Rankine Cycle Power plant. Waste heat can also be in turn recovered from this plant and used also as an energy source.

Some of the typical technical parameters of the equipment, which will be used in the trigeneration/cogeneration schemes, are as follows:

ITEM	TYPICAL CAPACITY RANGE	OTHER DETAILS
Engine/Turbine	500 kWe – 20 MWe	Typically fossil fuel fired
Absorption Chiller	150TR – 2000TR	Chilled water temperatures from 0 °C to 10 °C
Organic Rankine Cycle Power Plant	1 MWe – 10 MWe	Waste Heat fired
Hot Water Heat Exchangers	250 kWth – 10 MWth	Recovery heat from engine/turbine @ temperatures from 60 °C – 140 °C

Trigeneration and cogeneration systems are to be implemented under the proposed PoA in both new buildings as well as in existing buildings. In other words two Project Scenario Types are catered for under the PoA.

Project Scenario Type	Description
1	The Project replaces systems that would have been built in new buildings
2	The Project replaces/supplements existing systems

Project Scenario Type 1.

Under this project scenario type, the CPA installs a trigeneration or a cogeneration system in a new building (new consumers), thus preventing a more GHG intensive system to provide electricity, cooling and heat from being installed.

Project Scenario Type 2.

[2] http://www.miraclei.com/alternative_energy/trigeneration.html

Under this project scenario, the CPA installs a trigeneration or a cogeneration system that either replaces or supplements the operation of systems that supply electricity (grid or onsite generation) and cooling (eg chillers) and/or heating systems (e.g. hot water boilers) to an existing building (existing consumers).

Applicable national and/or sectoral policies and regulations, which are relevant to the PoA for each host country, are discussed in the following table

Host country	**National and/or sectoral policies and regulations which are relevant to the PoA**	**Reference**
Kingdom of Saudi Arabia.	There are no national, nor sectoral policies nor regulations that mandate nor provide incentives to projects that introduce cogeneration nor trigeneration schemes in the Kingdom of Saudi Arabia. Nor are there any policies and regulations that require nor incentivise the use of absorption chillers in the country.	• Letter from Mohammed A. Turki Mott MacDonald (MTMM)Consulting Engineers • Published paper: "Energy Policies of Gulf Cooperation Council (GCC) countries – possibilities and limitations of ecological modernization in rentier states" Daniel Reiche, 2010. • Published Study "*Delivering on the Energy Efficiency promise in the Middle East.* Oliver Wyman, 2012
Oman	There are no national, nor sectoral policies nor regulations that mandate nor provide incentives to projects that introduce cogeneration nor trigeneration schemes in the Oman. Nor are there any policies and regulations that require nor incentivise the use of absorption chillers in the country	• Letter from MTMM Consulting Engineers • Published paper: "Energy Policies of Gulf Cooperation Council (GCC) countries – possibilities and limitations of ecological modernization in rentier states" Daniel Reiche, 2010 • Published Study "*Delivering on the Energy Efficiency promise in the Middle East.* Oliver Wyman, 2012
Egypt	There are no national, nor sectoral policies nor regulations that mandate nor provide incentives to projects that introduce cogeneration nor trigeneration schemes in Egypt. Nor are there any policies and regulations that require nor incentivise the use of absorption chillers in the country	• Letter from MTMM Consulting Engineers. • Published Study "*Delivering on the Energy Efficiency promise in the Middle East.* Oliver Wyman, 2012 • Egyptian Electricity Holding Company 2010/2011 report. Ministry of Electricity and Energy http://www.moee.gov.eg/English/e-fr-main.htm

A.7. Public funding of PoA

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The PoA does not receive any public funding. However, any public funding that may be awarded to any specific SSC-CPAs will be described in the corresponding SSC CPA-DD. In such a case, confirmation shall be provided that such funding does not result in a diversion of Official Aid Assistance (ODA).

SECTION B. Demonstration of additionality and development of eligibility criteria

B.1. Demonstration of additionality for PoA

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Here the PPs shall demonstrate, using the procedure provided in the baseline and monitoring methodology applied, additionality of a typical CPA.

The PoA aims to introduce Trigeneration/cogeneration systems is both new buildings (i.e. ones that have yet to be built) and existing buildings, to either prevent new, but more carbon intensive systems from being installed or to displace existing, more carbon intensive systems. As discussed above, there are two project scenario types that are catered for under the proposed PoA. The additionality shall always be assessed and demonstrated by showing that in accordance to Annex 27. Guidelines on the Demonstration of additionality of small scale project activities. (Version 09.0) that the proposed SSC CPA wouldn't have been implemented due to an investment barrier, and that a financially more viable alternative to project activity that would have led to higher emissions. No other barriers shall be used to assess and demonstrate additionality. The approaches applied to assess and demonstrate the additionality of SSC CPAs corresponding to each of such project scenario types is described below, referring to the relevant substeps of *Step 2:Investment analysis of the Tool for the demonstration and assessment of addtionality* (Version 07.0.0).

Assessment and Demonstration of Additionality

Assessment and Demonstration of Additionality for Project Scenario Type 1 SSC CPAs

Determination of appropriate investment analysis method and financial indicator selection

Project Scenario Type 1SSC CPAs involve the installation of a trigeneration/cogeneration system in a *new building.* There are two business modalities that can be applied to introduce trigeneration systems in new buildings under the PoA:

1. ***ESCO, third party modality.***

Whereby the SSC-CPA Implementer is a third party and undertakes the investment in the cogeneration or trigeneration system and incurs in the ongoing cost of operating it. The CPA implementer sells electricity, chilled water and heat in the form of hot water and/or steam to the users and charges a rate for providing these to the consumers. In other words the implementer becomes a building energy and utilities supplier.

The SSC CPA Implementer, e.g. ESCO, technology supplier, etc. in these cases has the option to choose whether to make such an investment or not.

An investment in a conventional, more carbon intensive system would have therefore been made by the company constructing the building instead. Hence, an investment is to be made, but one which is outside

the control of the SSC CPA implementer, who wishes to introduce the trigeneration system into the new building's design.

Therefore, in accordance to the "Guidelines on the assessment of the investment analysis" EB 62, Annex 5, Version 05, paragraph 13 the appropriate investment analysis method is a Benchmark Approach, i.e. *Sub-step 2b.Option III of Tool for the demonstration and assessment of addtionality* (Version 07.0.0)

If the Project IRR is less than the benchmark, then the proposed SSC CPA is deemed not to be most financially attractive option for an investor to pursue.

2. ***Engineering Procurement and Construction EPC.***

Whereby the investment in the Cogeneration or Trigeneration system is made by an entity that has a stake in the operation and maintenance of the building once it has been commissioned. In the absence of the CDM the building would have been fitted with a conventional, more carbon intensive system to meet its electrical, cooling and heating requirements. In other words an investment would have been made anyhow. In this case the investment is made by an entity who has a stake in the building's operation once it has been commissioned and is responsible for sourcing of energy and meeting the building's requirements for space cooling and heat.

In the absence of the SSC CPA involves an investment being made by the entity who will be ultimately responsible for running the building's energy facilities and ensuring that its electricity, cooling and heating requirements are met. In this case, the SSC-CPA implementer has to make an investment anyway in a system to provide the same services, i.e. electricity, cooling and heating in the building. The SSC CPA implementer in this case opts for the building solution that enables the building's electrical, cooling and heating loads to be met at the lowest cost (taking into account the total costs associated with the project, including capex, fuel, energy and O&M costs).

Hence as per paragraph 19 of the "Guidelines on the assessment of investment analysis an investment comparison analysis is a suitable approach to be applied in such cases, and is to be carried out in accordance with *sub step 2b Option II "Tool for the demonstration and assessment of additionality" (Version 07.0.0)* and the guidance contained therein. The chosen financial indicator is the Net Present Value of the total costs. If there is a viable alternative to the proposed SSC CPA that has less NPV costs, then the proposed project activity is deemed to be not the most financially attractive alternative.

Assessment and Demonstration of Additionality for Project Scenario Type 2

Determination of the appropriate investment analysis method and financial indicator

In this project scenario, the Trigeneration or Cogeneration system that is to be installed replaces/supplements the operation of systems that supply electricity (grid or onsite generation) and cooling (eg. chillers) and/or heating systems (e.g hot water boilers) to consumers in an *existing building.*

There are two business models that can be applied to introduce trigeneration systems in such circumstances under the PoA:

1. ***ESCO, third party modality***

Whereby the SSC CPA Implementer undertakes the investment in the trigeneration or cogeneration system and its ongoing operation, with the associated costs to replace or expand the capacity of an existing system. The CPA implementer sells electricity, chilled water and hot water to the consumers at certain rates. This is the same as the case described above, in that the investor has the choice whether to

invest in such a project under these terms or not. Hence a benchmark investment analysis approach is appropriate, i.*e. Sub step 2b: Option III* of the *Tool for the demonstration and assessment of addtionality (*Version 07.0.0).

2. ***Engineering Procurement and Construction, EPC.***

Whereby the investment and ongoing operating costs are made by the owner of the building or the entity responsible for meeting the electricity, cooling and heat energy needs of the existing consumes.
In this case the owner of the existing facility invests in a Trigeneration or cogeneration system and reduces the costs associated with meeting the building's electrical, cooling and/or hot water loads. The owner may in the absence of the project opt to:

a) Keep the existing system in operation

b) Replace the existing system with one which reflects common practice in the market

In this case, the SSC CPA implementer has to either continue to incur in the costs of operating and maintaining the existing system or has to make an investment anyway in a system to provide electricity, cooling and heating in the building at some point in time as a result of the existing systems reaching the end of their useful life. Hence as per paragraph 19 of the "Guidelines on the assessment of investment analysis an investment comparison analysis is to be applied, i.e *Sub step 2b Option II* of the *Tool for the demonstration and assessment of addtionality* (Version 07.0.0), using the NPV of the costs as the financial indicator.

In this case additionality is assessed by comparing the NPV of the total costs of the proposed project activity with that of an alternative. If the NPV of the total costs of such alternative is less than that of the project activity and that this same conclusion holds for realistic variations in the key parameters that influence the NPV of the costs, then the proposed SSC CPA is deemed additional.

Calculation and comparison of the financial indicators (as per *Sub-step 2c* of the Tool *for the demonstration and assessment of addtionality* (Version 07.0.0))

It follows from the above discussion that there are two financial indicators that can be applied to assess and demonstrate additionality depending on the business modality involved, i.e. whether:

a. the entity that aims to implement the SSC CPA has the choice to make an investment in a system to provide electricity, cooling and heat to a building or not to do so, or

b. the entity that aims to implement the SSC CPA must either:

   - Incur in an ongoing expenditure to either keep an existing system running or,
   - Make an investment anyhow and install a new system, be it in a building that is yet to be built or one that already exists.

In other words, the SSC CPA Implementer has no option but to incur in an expenditure to provide the electricity, cooling and heat that the building needs.

The calculation of the financial indicators and relevant benchmarks /discount factors for each of the two approaches as per *Sub-step 2c* of the *Tool for the demonstration and assessment of addtionality* (Version 07.0.0) are described below.

Investment analysis approaches, indicator and benchmark calculation:

Indicator and Benchmark calculation for Benchmark Analysis Approach

To be applied to: SSC CPAs implemented under ESCO, third party modality schemes

Choice of and Calculation of indicator:

When undertaking a Benchmark Analysis as per Sub step 2b Option III of the "Tool for the Demonstration and assessment of additionality", additionality may be demonstrated by calculating the project IRR, which shall be determined on a Pre Tax basis, and by demonstrating that its value is below the benchmark, and that it can be shown that the variations in the values of key parameters that impact the project IRR that would lead to the IRR reaching benchmark, are unlikely to materialise.

Project Pre Tax IRR calculation

The project Pre Tax IRR is chosen as the financial indicator and shall be determined based on information, data and economic parameters provided by the SSC CPA implementer that were available at the time when the investment decision was made. This list of parameters includes:

Table 1: Parameters for project Pre tax IRR and NPV calculations

PROJECT DATA		
	Unit	**Comments/Source**
Technical lifetime	Year	Estimation of technical lifetime based on information provided by technology providers or the Chartered Institution of Building Services Engineers.
Investment decision date	DD/MM/YYYY	Can be sourced from. board decision, loan agreement or main equipment purchasing contract
Construction start date	Year	Can be sourced from constructor quotation, Feasibility Study, Project Status Report, or civil work contract
Date project starts operating	Year	Can be sourced from scheduled Commissioning date
FINANCIAL PARAMETERS		
	Unit	**Comments/Source**
Total amount of electricity sold	kWh/y	Can be sourced from the project developer or Feasibility Study
Total amount of cooling sold	kWh/y	Can be sourced from the project developer or Feasibility Study
Total amount of heat sold	kWh/y	Can be sourced from the project developer or Feasibility Study
Electricity tariff	Local currency unit/kWh	As per contract with electricity buyer when available or the rate that would have had to be paid for sourcing power from the grid.
Fuel price	Local currency unit/kWh	Can be source from Fuel supplier, supply contracts
Water rate	Local Currency/m3	Water utility, supply contracts
Cooling Tariff	SAR/kWh	Cooling supply agreement between the supplier and the offtaker
Heat Tariff	SAR/kWh	Heat supply agreement between the supplier and the offtaker

Inflation rate	% per year	If not otherwise specified, annual change in consumer price index at date of investment decision is used. It can be sourced from the Central Bureau statistic or any relevant evidences
Exchange Rate	Foreign currency/local currency unit	FOREX, Host Country Central Bank's or other relevant websites or sources
COSTS AND EQUIPMENT		
	Unit	**Comments/Source**
Total investments	USD	.If the construction is expected to take place over several years, a yearly breakdown of investments can be provided. The value can be sourced from the project developer design or feasibility study.
Annual Operation & Maintenance cost (Project activity)	USD /year	Can be sourced from Feasibility Studies or technology providers
Annual Operation & Maintenance cost (Existing plant)	USD/year	Maintenance contract invoices and energy invoices
(Other operating expenditure)	USD /year	Can be sourced from Feasibility Studies or technology providers
Insurance	% of Capex p.a.	Can be sourced from insurance quotation/contract

Calculation of Benchmark

In cases where the SSC CPA implementer has the choice to make or not the investment in installing a trigeneration or a cogeneration system, a benchmark shall be determined against which the project IRR shall be compared to. Trigeneration and Cogeneration projects, are expected to be typically financed by means of a combination of loan and equity financing. The Benchmark that reflects an investor's expected return based on parameters that are standard to the market shall therefore be the country-specific Weighted Average Cost of Capital (WACC).

The WACC is defined as the average return expected across the different types of capital that finance a given project.

For the purpose of this PoA the WACC may be determined for each SSC-CPA by using the following rules:

- All financial information used for the benchmark determination will be sourced from independently verifiable sources

- The cost of equity may be determined using the capital asset pricing model (CAPM).

The WACC may be calculated as follows:[3]

[3] Velez-Pareja, Ignacio and Tham, Joseph, "A Note on the Weighted Average Cost of Capital WACC" (August 7, 2005). Available at SSRN: http://ssrn.com/abstract=254587. Tax is excluded from the standard WACC formula to establish a pre-tax benchmark.

$$WACC = CD \times \%Debt + CE \times \%Equity$$

and,

$$WACC(post-tax) = CD \times (1-T) \times \%Debt + CE \times \%Equity$$

The cost of equity (CE) may be determined based on the capital asset pricing model (CAPM) :

$$CE = RFR + \beta \cdot (RP) + SP$$

Where:

$$\beta = \beta unlevered \times (1 + (1-T) \times D/E)$$

Where:
T = Tax rate
D/E = Debt to equity ratio
The WACC (pre-tax) can in turn be determined by:

$$WACC(pre-tax) = WACC(post-tax)/(1-T)$$

Table 2 provides the parameters and sources from which their values may be drawn from in order to determine the WACC :

Table 2: Parameters for WACC calculation

Parameters	Description	Explanation and source
RFR	Risk Free Rate in a mature equity market	U.S long-term government bond is considered as risk free instrument. Bond rate is taken as the 6 month average prior to the investment decision and for a duration similar to the technical lifetime of the project activity. Source: eg. http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2010
ß *unlevered*	Beta (unlevered)	Total Beta (*Unlevered*) from Damadoran (Stern University) for the relevant sector; most recent year data before the investment decision was made. It reflects a firm's total exposure to risk rather than just the market risk component. It is a function of the market beta and the portion of the total risk that is market risk. These betas might provide better estimates of costs of equity for undiversified owners of businesses. Source: eg. http://pages.stern.nyu.edu/~adamodar/ “Total Beta by industry sector”
RP	Total Risk Premium	The Total Risk Premium includes an Equity Risk Premium and a Country Risk Premium. The reason behind this premium stems from the risk-return trade off, in which a higher rate of return is required to entice investors to take on riskier investments. Source:http://pages.stern.nyu.edu/~adamodar/ "Risk Premium for other Markets"
SP	Size Premium.	Size premium is an investor’s risk incurred when investing in

Parameters	Description	Explanation and source
		a small project. Betas are generally calculated based on data for large corporations. However companies of different sizes face different levels of risk. The smaller the company the fewer the sources of capital and investors require additional returns to compensate for the lower marketability of shares. According to Ibbotson Associates' statistics for 2009 [4]for the New York Stock exchange reveals that risk premium increases as the size of a company reduces: The equity risk premium of the largest 10% of companies is -0.36% (i.e. the firms in the largest 10% have an equity risk premium that is 0.36% below average). The smallest 10% of companies (up to 128 million USD) have a risk premium in excess of that determined by the CAPM of 5.81%. The usual way of accounting for this risk premium is to add this to the Cost of Equity (CE), as given in the equation for CE above. The PP may be apply the SP in cases where project CAPEX is less than 100 million USD Source. The Size risk premium can be sourced from the "*Ibbotson SBBI valuation yearbook"* published by Morningstar Inc
CD	Cost of Debt	As per EB61 Annex 13, Para 16.) If the WACC is based on parameters that are standard in the market, the cost of debt can be taken as the cost of financing in the capital markets, e.g. the host country commercial lending rate. The yield of a 10 year bond issued by the government of the Host country, if this is not available, the bond with the maturity which is closest to 10 years can also be used. The value of cost of debt can also sourced from the host country Central Bank or any other relevant evidences. The choice and source shall be clearly indicated in the CPA- DD and shall reflect the cost of debt at the time of the investment decision taking.
%Debt	% of finance from debt	Based on the finance structure of the project. If debt/equity finance structure is not yet available, 50% debt may be assumed As per EB 62, Annex 5, Para 17, 18
%Equity	% of finance from equity	Based on the finance structure of the project. If debt/equity finance structure is not yet available, 50% equity may be assumed As per EB 62, Annex 5, Para 17, 18
D/E	Debt to Equity ratio	Calculation
CE	Cost of Equity, ie Average expected return on equity	Calculated as per the CAPM eqn.
T	Tax rate	Host Country Tax regulation
Date of performing financial analysis	DD/MM/YYYY	Can be sourced from the date of the investment decision

[4] Ibbotson SBBI 2009 Valuation Yearbook, Chapter 7, page 96

Sensitivity analysis when applying Benchmark Analysis approach (as per *Sub step 2d* of the *Tool for the demonstration and assessment of addtionality* (Version 07.0.0)

As specified in the excel spreadsheet to be supplied to the DOE upon submission of a CPA DD, a sensitivity analysis will be conducted on variables that constitute more than 20% of either the total project costs or the total project revenues, and shall include the following variables: (1) total investment; (2) O&M, (3) Revenues (Electricity/Cooling/Heat energy sales). As per Guidance 21 of the Guidelines on the assessment of investment analysis Version 05[5], as general point of departure variations in the sensitivity analysis should at least cover a range of +10% and -10%, unless it is deemed inappropriate in the context of the specific SSC-CPA's circumstances.

The full results of each sensitivity analysis will be reported in the respective SSC CPA-DD using the following format:

Table 3: Framework for reporting results of IRR sensitivity analysis

Factor	**Variation**		
	-10% (or less if appropriate)	0%	10% (or more if appropriate)
Total investment			
O&M Cost			
Revenues			
Benchmark			

If the IRR in the sensitivity analysis exceeds the benchmark while altering one of the 3 parameters, the CPA implementers shall provide evidence that this scenario is unlikely to occur. If insufficient proof is provided, the SSC-CPA will be considered non-additional. Otherwise the CPA shall be deemed additional.

<u>Indicator and Discount factor calculation for Comparisson Analysis Approach</u>

To be applied to: SSC CPAs that would be implemented via Engineering, Procurement and Construction Projects and in which an expenditure would have been made by the SSC CPA Implementer to either continue to operate an existing system and/or install a new system anyhow at a given point in time to replace it.

Choice and calculation of indicator: NPV of Costs

When undertaking an Investment Comparison analysis as per Sub-step 2b: Option II of the "Tool for the Demonstration and assessment of additionality", additionality may be demonstrated by calculating the Net Present Value of the Costs associated with meeting a building's electrical, cooling and where relevant, heating requirements and comparing these costs against the NPV costs that would be incurred in if those same loads were to be met by the proposed SSC CPA. Additionality can then be demonstrated by showing that there is an alternative to the proposed SSC CPA where such loads can be met at a lower cost (lower NPV cost), and that it can be shown that the variations in the values of key parameters that impact the NPV costs of the project do not change this fact.

The NPV cost comparison analysis uses similar inputs as those used in determining the Project IRR. One important difference however is that NPV cost calculation compares the NPV of the costs of the proposed CPA and the chosen alternative against which it is to be compared. In both NPV calculations, the costs

[5] EB 62 Annex 5 "Guidelines on the assessment of investment analysis"

associated with having to purchase the electricity and fossil fuels needed to meet the buildings electricity, cooling and heating, must be considered.

In such analysis, the prices that would be paid for the electricity and fuels that would have been consumed in the alternative scenario and those that would be consumed by the SSC CPA to meet the electricity, cooling and heat demands of the building shall be taken as those existing at the time of the investment decision. Thus these are the electricity and fuel prices that would have had to have been paid for in the absence of the proposed project. Current and future energy prices may be assumed to be equal. Where project participants intend to use future prices that are different from current prices, the future prices have to be substantiated by a public and official publication from a governmental body or an intergovernmental institution.

Discount rate determination

The discount rate applied is the rate of return that the SSC CPA implementer expects to obtain from the investment. The selection of the discount rate therefore shall reflect the sector in which the investment is made in and shall be clearly indicated in the CPA DD. It shall be noted that some of the buildings in which the trigeneration or cogeneration systems may be installed under the PoA may be owned by Public entities. Hence it is not appropriate to apply a private sector discount rate nor financial parameters to investments that are made by a public sector entity.

Suitable Discount rates to be applied are indicated in the following table

Table 4:Discount factor considerations for NPV cost calculation

CPA Implementers	Discount rate type that may be applied	Sources of information upon which to determine the value to be applied
Private sector entities	WACC	As per WACC calculation above
Government / State owned entity	Government Bond Rate or Govt./official approved discount rate	Host Country Central Bank

Sensitivity analysis when applying Investment Comparison Analysis (as per *Sub-step 2c* of the *Tool for the demonstration and assessment of addtionality* (Version 07.0.0)

As specified in an excel spreadsheet to be supplied to the DOE upon submission of a CPA DD, a sensitivity analysis shall be conducted on variables that constitute more than 20% of either the total project costs or the total project revenues, and shall include the following variables: (1) total investment for the proposed SSC CPA ; (2) O&M Costs for both the SSC CPA and the existing system, (3) Energy costs associated with the ongoing operation of the existing system and those which would be incurred in under the proposed SSC CPA.

Table 5: Framework for reporting results of NPV costs sensitivity analysis

Factor	**Variation**	
	Existing System +10% (or more if appropriate)	Proposed SSC CPA -10% (or less if appropriate)
Total investment	--	<< >>%

O&M Cost	<< >> %	<< >> %
Energy costs	<< >> %	<< >> %

If the NPV of the total costs of the proposed SSC CPA in the sensitivity analysis is less than the NPV of the costs associated with the operation of the existing system while altering one the 3 parameters, the SSC CPA implementer shall provide evidence that this scenario is unlikely to occur. If insufficient proof is provided, the SSC-CPA will be considered non-additional. Otherwise the CPA shall be deemed additional.

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

>>

A CPA to be included in the proposed PoA shall fulfill the following conditions:

	Eligibility criteria	**Reference or supporting documentation to be provided**
1	The Geographical boundary of the CPA shall be within the geographical boundary of the PoA	Geographical coordinates of the site where the SSC CPA is to be built showing its relation to the boundary of the PoA
2	The CPA implementer shall demonstrate that the project activity shall not lead to double counting of Emission Reduction by confirming that this project activity shall not be a part of any of the below mentioned categories post approval of the project activity under CDM: (1) Standalone CDM project activity, (2) Bundled CDM project activity, (3) Another registered PoA. The duration of the crediting period of the SSC CPA shall not exceed that of the PoA	Information provided in the Record Keeping System and assessment of the information thereof, carried out in accordance with doublecounting avoidance check described in section A 4.4.1 *(d* of the PoA DD and described in the SSC CPA DD of the SSC CPA seeking inclusion in the POA.

<table>
<tr><th></th><th>Eligibility criteria</th><th>Reference or supporting documentation to be provided</th></tr>
<tr><td>3</td><td>Shall consist of Fossil fuel based co-generation or Trigeneration systems to supply electricity, cooling and/or heating in non-industrial buildings in which the main items of plant equipment, where applicable, shall comply with following specifications and certifications
<table>
<tr><th>ITEM</th><th>CAPACITY RANGE</th><th>CERTIFICATIONS REQUIRED</th><th>OTHER DETAILS</th></tr>
<tr><td>Fossil Fuel Fired Turbine</td><td>2 MWe – 20 MWe</td><td>Tested to ISO 2314:2009 (or equal and approved) Electrical Efficiency to be > 20% on a NCV basis</td><td></td></tr>
<tr><td>Fossil Fuel Fired IC Engine</td><td>500 kWe – 4 MWe</td><td>Tested to ISO 3046 (or equal and approved) Electrical Efficiency to be > 25% on a NCV basis</td><td>Hot water output temperature range 60°C – 120°C</td></tr>
<tr><td>Absorption Chiller</td><td>150TR – 4000TR</td><td>AHRI, ANSI, BS, EN, ISO or equal and approved</td><td>Chilled water temperatures from 0 °C to 10 °C</td></tr>
<tr><td>High Efficiency Electric Chillers</td><td>100- 4000TR</td><td>AHRI, ANSI, BS, EN, ISO or equal and approved</td><td>Chilled water temperatures from -5°C to 15°C</td></tr>
<tr><td>Heat Recovery Steam Boiler</td><td>0.5 t/h – 25 t/h</td><td>PED 97/23/EC (or equal and approved)</td><td>Pressures in range 1 bar – 30 bar Temperatures in range 120 °C – 400 °C</td></tr>
</table></td><td>Any of the following: Detailed project report, FSR, quotation from technology provider, purchase order, EPC, etc.</td></tr>
<tr><td>4</td><td>Start date of the CPA is not, or will not be, prior to the date on which the CDM-PoA-DD is first published for Global Stakeholder consultation</td><td>Any one of the following: EPC contract, equipment purchases order, unless such documentation does not exist because the SSC CPA has yet to start.</td></tr>
<tr><td>5</td><td>Meet baseline and monitoring methodology AMS II.K requirements as given in Section B.3 for new and existing buildings</td><td>Please refer to Section B.3.</td></tr>
<tr><td>6</td><td>The proposed CPA is a voluntary initiative by the CPA implementer. The CPA implementer is not implementing a mandatory policy or regulation</td><td>Signed declaration by the SSC CPA implementer confirming that the measure is a voluntary (non mandatory) one, and third party documentation to confirm such claim (e.g from third party consultants or Govt. entities, etc).</td></tr>
</table>

<table>
<tr><th></th><th>Eligibility criteria</th><th>Reference or supporting documentation to be provided</th></tr>
<tr><td>7</td><td>The Project Pre Tax IRR of the proposed CPA based on parameters and sources given in Table 1 of Part I the PoA DD must be less than the applied Pre Tax WACC benchmark based on the following
<table>
<tr><th>Parameters</th><th>Description</th><th>Example of Sources</th></tr>
<tr><td>RFR</td><td>Risk Free Rate in a mature equity market</td><td>U.S long-term government bond.
Source: eg. http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2010</td></tr>
<tr><td>ß unlevered</td><td>Beta (unlevered)</td><td>Total Beta (Unlevered) from Damadoran (Stern University) for the relevant sector; most recent year data before the investment decision was made. Source: eg. ttp://pages.stern.nyu.edu/~adamodar/
“Total Beta by industry sector”</td></tr>
<tr><td>RP</td><td>Total Risk Premium</td><td>Source:http://pages.stern.nyu.edu/~adamodar/
"Risk Premium for other Markets"</td></tr>
<tr><td>SP</td><td>Size Premium.</td><td>Source. The Size risk premium can be sourced from the “Ibbotson SBBI valuation yearbook” published by Morningstar Inc</td></tr>
<tr><td>CD</td><td>Cost of Debt</td><td>The yield of a 10 year bond issued by the government of the Host country, if this is not available, the bond with the maturity which is closest to 10 years can also be used. The value of cost of debt can also sourced from the host country Central Bank or any other relevant evidences.</td></tr>
<tr><td>%Debt</td><td>% of finance from debt</td><td>Based on the finance structure of the project.
If debt/equity finance structure is not yet available, 50% debt may be assumed As per EB 62, Annex 5, Para 17, 18</td></tr>
<tr><td>%Equity</td><td>% of finance from equity</td><td>Based on the finance structure of the project.
If debt/equity finance structure is not yet available, 50% equity may be assumed As per EB 62, Annex 5, Para 17, 18</td></tr>
<tr><td>D/E</td><td>Debt to Equity ratio</td><td>Calculation</td></tr>
<tr><td>CE</td><td>Cost of Equity, ie Average expected return on equity</td><td>Calculated as per the CAPM eqn.</td></tr>
<tr><td>T</td><td>Tax rate</td><td>Host Country Tax regulation</td></tr>
</table>
parameters and sources presented in Table 2 of Part I of the PoA DD:</td><td>WACC (pre tax based) Benchmark Analysis presented part of the corresponding CPA DD submission.</td></tr>
</table>

	Eligibility criteria	Reference or supporting documentation to be provided
	This eligibility criterion is applicable to project scenarios in which the CPA implementer is a third party investor (e.g. a technology promoter, ESCO, etc) invests in the project and sells the electricity, cooling and heat that is produced, i.e. has the choice to make the investment or not). Additionality shall not be assessed by any of the other barriers listed in EB 68 Annex 27. Guidelines on the Demonstration of additionality of small scale project activities. (Version 09.0)	
8	There is an alternative, more GHG intensive means of meeting the building's electricity, cooling and heat requirements which have a lower NPV cost than that of the proposed CPA. This eligibility criterion is applicable to project scenarios in which the CPA implementer would have made an investment anyway). Additionality shall not be assessed by any of the other barriers listed in EB 68 Annex 27. Guidelines on the Demonstration of additionality of small scale project activities. (Version 09.0).	NPV Cost comparison analysis presented as part of submission of corresponding SSC CPA DD applying such approach.
9	An agreement shall be in place between the CPA implementer and the Coordinating and Managing Entity (CME), authorizing the CME to include the CPA into the PoA and therefore ceding the carbon rights to the CME.	ERPA or any other document signed between the SSC CPA implementer where the CPA implementer cedes the rights the carbon rights to the CME.
10	The proposed SSC CPA does not receive any Annex 1 parties funding, or if it does, such funding does not result in a diversion of official development assistance.	Written affirmation that if funds from Annex 1 funds are used, that such funding does not result in a diversion of official development assistance from the donor party.
11	The energy savings caused by a single project activity may not exceed the equivalent of 60 GWh per year. A maximum saving of 60 GWh is equivalent to maximum savings of 60 GWh_e of electricity consumption or maximum savings of 180 GWh_{th} of fuel consumption, i.e., for calculation of maximum savings allowable per year, 1 GWH_e equals 3 GWH_{th}.	Energy savings calculations presented by the CME or by project CPA implementer but revised by the CME
12	The Proposed SSC CPA is not a debundled component of a large scale activity. SSC CPA shall demonstrate compliance with the EB 54 Annex 13 "Guidelines on assessment of de-bundling for SSC project activities". The CPA is considered as debundled if both conditions (a) and (b) below are satisfied: a. Has the same activity implementer as the proposed small scale CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same technology/measure, and; b. The boundary is within 1 km of the boundary of the proposed small-scale CPA at the closest point.	Information provided in the Record Keeping System and assessment of the information thereof, carried out in accordance with debundling check procedure described in section A 4.4.1 *(i)* of the PoA DD on the SSC CPA seeking inclusion

The above eligibility criteria shall be updated, and the consequent changes will be included in a new version of the PoA-DD and new generic SSC CPA-DD validated by a DOE, and shall be submitted to the Board for approval in the following events:

- If the applied methodology is revised or replaced.
- If the boundary of the PoA is amended post-registration to expand the geographic coverage or to include an additional host Party/ies.
- If the revision of eligibility criteria is requested by the Board at any time during the lifetime of the PoA.

(a) Once changes have been approved by the Board, the inclusion of all new SSC- CPAs shall be based on the updated eligibility criteria applying the new generic SSC CPA- DD;

(b) SSC-CPAs that were included before the methodology was put on hold shall apply the revised version of the generic SSC CPA-DD only at the time of the renewal of the crediting period.

- At the renewal of the crediting period of a PoA (at the renewal of the first SSC-CPA),

B.3. Application of methodologies
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Referring to the UNFCCC CDM web-site, as per appendix B to the simplified modalities & procedures for small scale project activities, the sectoral scope, type and category and methodology applicable to SSC CPAs developed under the proposed PoA are:

Sectoral scope : 03
Type : Type II – Energy Efficiency Improvement Projects
Category : AMS II K, *"Installation of co-generation or tri-generation systems supplying energy to commercial buildings"*.

Any SSC CPA will also apply the following tools and guidelines, as per the requirements of AMS II K / Version 02.0:

"*Tool to determine the remaining lifetime of the equipment" (Version 01)*

"General Guidelines to SSC CDM methodologies" (Version 19)

"*Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"(Version 02)*

"*Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01)*

"Consolidated baseline and monitoring methodology for fuel switching from coal or petroleum fuel to natural gas" ACM0009/ Version 03.2

Baseline and Monitoring Methodology AMS II.K "*Installation of co-generation or tri-generation systems supplying energy to commercial buildings*", version 02.0 is applied in this PoA because the SSC CPAs to be implemented under the PoA consist in the installation of trigeneration or cogeneration systems supplying energy to commercial buildings and which result in energy savings that do not exceed 60 GWh per year throughout the crediting period and meet the applicability criteria given in AMS II.K / Version 02.0.

The applicability criteria of AMS II K. Version 02.0	How each SSC-CPA complies to AMS II.K Version 02.0 and the means whereby this can be confirmed depending on the Project Scenario Type that the SSC CPA implements:	
1.This methodology applies to the installation of fossil fuel based co-generation or tri-generation facilities that simultaneously produce electricity and cooling (e.g., chilled water) and/or heating (e.g., steam or hot water) for supplying such energy to commercial, non-industrial, buildings.	1. SSC-CPAs to be included under the PoA shall consist of fossil fuel based co-generation or trigeneration facilities that will simultaneously produce electricity and cooling (eg. chilled water) and/or heating (eg., steam or hot water) to commercial and other non industrial buildings such as university campuses, hospitals and other institutional buildings	Project description and simplified schematic as described in the SSC - CPA DD
2. The methodology is applicable to installation of new cogeneration or tri-generation systems that replace or supplement either: the operation of (a) existing systems that supply electricity (grid or on-site generation) and cooling (e.g., chillers) and/or heating systems (e.g., boilers) or (b) electricity and cooling and/or heating systems that would have been built and utilized.	2.SSC-CPAs to be included in the PoA involve the installation of new cogeneration or trigeneration systems that replace or supplement either: the operation of (a) existing systems that supply electricity (grid or onsite generation) and cooling (e.g. vapour compression chillers) and or heating systems (e.g hot water boilers) or (b) electricity and cooling and/or heating systems that would have otherwise been utilized	Project description and schematic as described in the CPA DD
3. The methodology does not apply to the replacement of existing co-generation or tri-generation systems.	3. No SSC –CPA shall involve the replacement of an existing co-generation or trigeneration system	Project scenario Type 1. Not applicable, hence no evidence is required to confirm compliance Project scenario Type 2. Drawings of the existing facilities and signed declaration from the CPA Implementer
4. If it is identified that the baseline situation is the continued use of an existing system then the existing system must have been in operation for at least the immediately prior three years, to the start date of the project activity, in order to ensure that adequate baseline performance data are available	4.The PoA caters for SSC – CPAs which install Cogeneration or trigeneration systems at sites in which an existing system has been operation and shall ensure that whenever this is the case, that the site's existing system must have been in operation for at least 3 years prior to the start date of the SSC-CPA. This to ensure that adequate baseline performance data from the existing system can be gathered if the baseline is to be	Project scenario Type 1. Not applicable –no evidence required Project scenario Type 2. Plant log book data or other plant reports, e.g. maintenance records, that show that the building's energy system have been in operation at least for the last three years counting back from the start date of the proposed SSC CPA

	considered the continued operation of the existing system.	
5. This methodology only applies to commercial, non-industrial applications. Projects that comprise energy efficiency measures implemented through integration of a number of utility provisions (for example, integrating power, steam/heat and cooling systems) of an industrial facility cannot apply this methodology.	5.The goal of the PoA is to deploy cogeneration / trigeneration systems for the provision of electricity, cooling and/or heat for use in non industrial buildings, such as shopping malls, hospitals, institutional buildings, campuses, hotels, to mention some.	Project Scenario Type 1: Feasibility study or Construction plans or simplified drawings or project promotional brochures describing the building's application. Project Scenario Type 2: Publicly available literature describing the building, eg brochures, advertisements, drawings, etc
6. For the purpose of this methodology, natural gas is defined as a gas which consists primarily of methane and which is generated from (i) natural gas fields (non-associated gas), (ii) associated gas found in oil fields. It may be blended up to 1% on a volume basis with gas from other sources, such as, *inter alia*, biogas generated in biodigesters, gas from coal mines, gas which is gasified from solid fossil fuels, etc.[6]	6. SSC-CPAs under the PoA may involve cogeneration /Trigeneration systems at some point in the future that are run from natural gas obtained from gas mains. Natural gas used in the host countries covered by this PoA result from a combination of associated and non associated gas.	If natural gas is used by the proposed SSC CPA, confirmation from the natural gas supplier shall be provided such that if the natural gas is blended with gas from other sources, that the concentration of gas from such sources does not exceed 1% on a volume basis
7. Any chilled water/cooling, steam/hot water/heat and electricity produced by the cogeneration or trigeneration system must be used on-site (within the project	7. Any chilled water/cooling, steam/hot water and electricity that is produced by the SSC-CPA will be used within the project boundary to meet either	Project Scenario Type 1. Building's Construction plans or drawings showing the location of the facility or facilities that will consume the energy

[6] This limitation is included because the methodology does not provide procedures to estimate the GHG emissions associated with the production of gas from these other sources. Project activities that use gas that does not comply with this definition must apply for a revision of the methodology.

boundary) to meet all or part of the energy demand. Existing chillers, boilers, electrical heaters, electricity generating units, etc. may remain in operation after the implementation of the project activity to either (a) supply the balance of the demand not met by the cogeneration or trigeneration systems if the cogeneration or trigeneration system has insufficient capacity to supply the total energy demand and/or (b) provide backup to the cogeneration or trigeneration facilities. However, emission reductions can only be claimed for the cooling, heat and electricity produced by the new cogeneration or trigeneration system.	all or part of the building's energy demand. In certain cases, the SSC – CPAs cogeneration/regeneration system to be installed will not have sufficient capacity to meet the entire demand for power, cooling and heating. In such cases, equipment which existed prior the implementation of the SSC-CPA may a) continue to be used to supply the balance of the demand that cannot be met by the SSC CPA and/or b) provide back up to the cogeneration or trigeneration facilities. Emissions reductions shall only be claimed for the cooling, heat and electricity that is obtained from the SSC-CPA's cogeneration or trigeneration system.	Project Scenario Type 2. Log book information to show that the existing plant is in operation. Utility drawings of the existing system showing the points where the new cogeneration or trigeneration system components tie into, eg. If the chilled water to be produced by the proposed SSC CPA is to share an existing chilled water distribution piping network it must be shown where the proposed system would it tie into the existing one. The location of metering and instrumentation required to implement AMS II K shall be highlighted on such diagrame to ensure that the quantity of electricity and thermal energy that is produced by the trigeneration plan can be clearly differentiated from that produced by the existing equipment, to avoid counting the chilled water which would be produced by the existing system as being produced by the new cogeneration/trigeneration system. The same applies to any heat being generated by the trigeneration system.
8. The energy savings caused by a single project activity may not exceed the equivalent of 60 GWh per year. A maximum saving of 60 GWh is equivalent to maximum savings of 60 GWh_e of electricity consumption or maximum savings of 180 GWh_{th} of fuel consumption, i.e., for calculation of maximum savings allowable per year, 1 GWH_e equals 3 GWH_{th}.	8. All SCA-CPAs shall not exceed the referred maximum savings limit of 180 GWhth of fuel consumption. For calculation of maximum savings allowable per year for any SSC-CPA, 1 GWH_e equals 3 GWH_{th}.	Energy savings calculations presented by the CME or by project CPA implementer but revised by the CME
9. The project activity can include installation of cooling equipment which use refrigerants only if such refrigerants have no ozone depleting potential (ODP) and if	9. SSC-CPAs shall involve the installation of absorption chillers using LiBr. The working fluid therefore does not have a ozone depleting	Cooling Equipment design specifications, feasibility study.

such installation is not mandated by laws or regulations.	potential. Trigeneration /cogeneration system may also include high efficiency electric chillers if such chillers are an integral part of the systems design. In such cases, the refrigerants that will used will have no ODP	
10. In case the produced electricity, cooling and/or heat are delivered to a facility that is not owned or under the control of the project owner, a contract between the project owner and consumer of the energy must be in force, during the crediting period, specifying that only the facility generating the energy can claim CERs from the emissions displaced by the subject project.	10. SSC-CPAs in which electricity, cooling and/or heat is delivered to an end using facility that is not owned or under the control of the CPA Implementer (the entity incurring in the investment in the project and who therefore needs the carbon revenue to overcome an investment barrier) shall enter into a contract with the consumer, which shall remain in force during the crediting period, specifying that only the facility generating the energy can claim CERs from the emissions displaced by the SSC CPA.	Applicable in ESCO commercial arrangements or others in which, in which the SSC-CPA implementer incurs in the investment and operation of the cogeneration or trigeneration system and sells power, cooling and heat to a facility where these are consumed. Agreement between the SSC-CPA Implementer and the consumer of the energy provided by the CPA Implementer's trigeneration system specifying that only the facility generating the energy can claim CERs from the emissions displaced by the subject project.

SECTION C. Management system

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The proposed PoA involves implementing a number of operational activities and management arrangements to ensure that any SSC - CPAs that seeks inclusion in the PoA meets the requirements and thereafter, are implemented and operated in accordance with the criteria and terms set out in the present PoA DD and the corresponding SSC-CPA-DD.

The three key entities involved in the management of the PoA and ensuring that each potential SSC CPA meets all the eligibility and applicability criteria before inclusion in the PoA are

CME

The CME is the entity ultimately responsible for the overall management of the PoA and ensuring that the CDM requirements are met. The implementation of the PoA however involves carrying out a number of tasks and ensuring that a number of arrangements are in place to ensure that the objectives of the PoA are met and that the inclusion of new CPAs and operation of the existing ones conforms to CDM requirements. This requires a unique blend of capabilities and skills, tailored to the measures being promoted under the PoA.

CES Carbon Services Ltd recognises such a need and has brought together entities capable of addressing both the need to conform with CDM requirements and at the same time, to pursue the widescale adoption of the trigeneration and cogeneration n concept in the countries covered by the PoA.

Technical Experts

CES Carbon Services Ltd will resort to, CES Energy Ltd’s technical expertise and experience in the delivery of trigeneration systems ranging from 1- 34 MWe, in Australia, Ireland and the UK, and on the capabilities and experience of its JV partners in the regional market. CES Energy, being a provider of trigeneration and cogeneration solutions has the competences required to assist the CME in screening potential CPAs to ensure that the comply with the technical requirements (Eligibility and Applicability criteria) as well as to provide the necessary support in the design and installation of the monitoring systems to ensure that they are in accordance with the monitoring plan described in the relevant SSC CPA DD. Additionally since CES Energy is an experienced Trigeneration/Cogeneration facility operator it may upon request, also provide monitoring and reporting services to ensure that the monitoring plan as indicated in a SSC CPA DD is implemented.

Other Technical experts may be resorted to provide similar support to the CME.

CDM Consultants

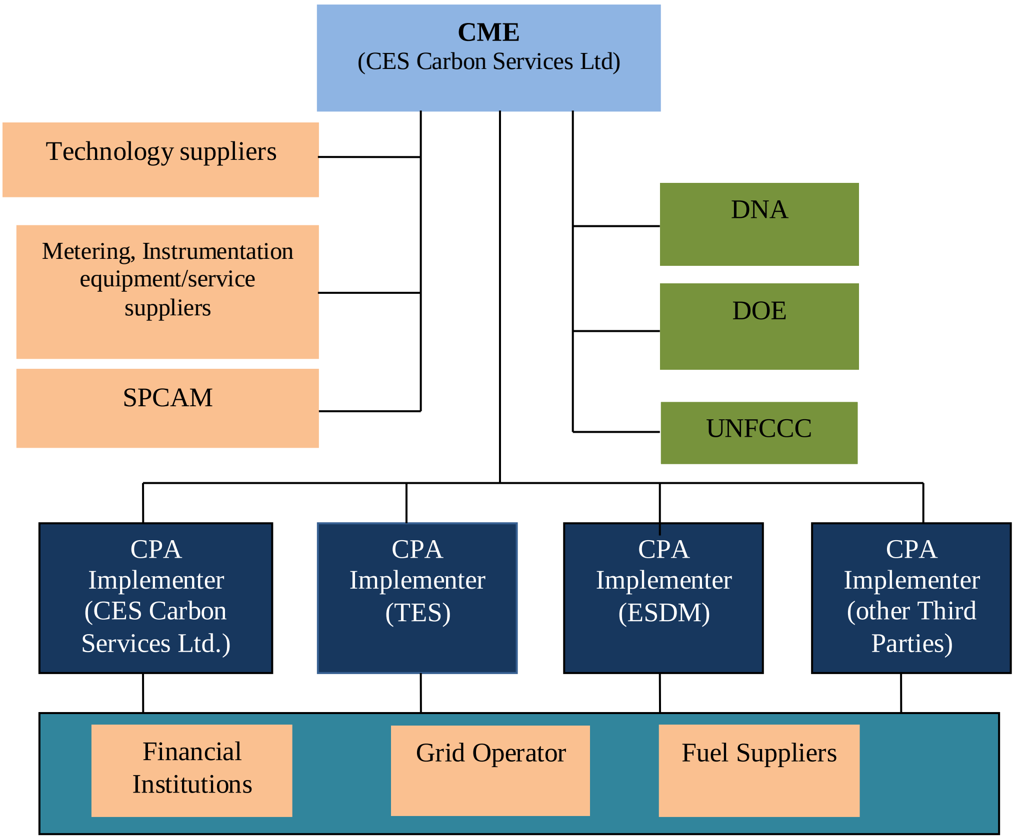
The CME will also be supported by a specialist CDM consultants/project developers, to assist it, in making sure that the PoA is run in accordance to the CDM requirements and that amongst other tasks, that relevant documentation is assembled and prepared for SSC CPAs that seek to be included in the PoA. The carbon consultants shall ensure that all CDM specific requirements (CDM specific eligibility and applicability criteria) are met by SSC CPAs seeking inclusion in the PoA.

CES Carbon Services Ltd will commission a specialized Carbon Services company to ensure that potential SSC CPAs are progressed along the SSC – CPA CDM project cycle within the PoA. During the initial stages of the PoA’s roll out, South Pole Carbon Asset Management Ltd. (SPCAM) will provide this support, in accordance to the criteria described in the CME Manual. Having registered a significant number of CDM projects, SPCAM staff is deemed to be competent to provide such support

These entities interact with each other and other key PoA Stakeholders, as described in the following chart.

All three entities above have been involved in the development of the PoA and the relevant documentation and management of the process leading up to the registration of the PoA. Hence the entities involved and their personnel are deemed to be competent to check the features of potential CPAs and ensure that each CPA meets all the requirements and eligibility criteria before inclusion in the registered PoA.

Figure 2. Key PoA Entities and their interaction



The CME's Management System Document has been presented to the DOE. The following are included.

(a) *Roles and responsibilities*

Implementing the PoA requires a number of specific tasks to be performed and responsibilities to be assigned to those based placed to take them on. These are described in the following table.
in Table 6. below

Table 6: Operational and Management responsibilities

Entity/Job Function	Management Responsibilities and Arrangements

CES Carbon Services Ltd PoA Manager	• Promote the PoA to potential SSC CPA implementers: - Awareness raising and trigeneration or cogeneration opportunity assessment - Identify and assess potential SSC CPAs: - Identification of barriers to the installation of trigeneration systems / propose possible solutions, and facilitate their development or provision as appropriate (in conjunction with technical experts such as CES Energy Ltd.) - Preliminary Emissions reductions and carbon revenue estimation (in conjunction with technical experts such CES Energy Ltd) - Initial CPA Eligibility Criteria compliance check (in conjunction with technical experts such as CES Energy Ltd.) - Terms of agreement signature - SSC CPA project design documentation Development - Coordination of Validation and inclusion of the CPA in the PoA - Maintenance of PoA CPA Record Keeping System - Finance raising where applicable • Review PoA's Performance • Implement improvement measures and Monitor effectiveness of improvement measures adopted • Maintain high Level relation with CPA Implementers • Communication with EB • Issuance
Specialist CDM Services company or CME CPA Manager	• Assess compliance of the proposed SSC CPA with the PoA's CDM specific eligibility and applicability criteria. • Inform the PoA Manager of the outcome of such assessment • Support SSC CPA implementer during project design and implementation: - Define roles and responsibilities of the parties involved in the development and operation of the SSC CPA. - Determine the support that the CPA implementer may require to build and operate the SSC CPA under the CDM. - Assist the CPA implementer in closing this gap. ii. • SSC CPA Monitoring system design and implementation or support during system set up (in conjunction with technical experts CES Energy Ltd) • SSC CPA Data recording and review of CPA site monitoring data • Record keeping and data back up / archiving as per CPA monitoring plan • Emissions reductions determination • Preparation of monitoring reports for emission reduction verification iii.

	• Coordinate and manage CPA Verification process • Review CPA overall project (technologies) and monitoring system performance: - Identify opportunities to improve specification, selection, installation, commissioning, operation and maintenance of underlying project to suit local requirements in KSA iv. - Identify opportunities to improve specification, selection, installation, commissioning and calibration of measuring equipment, as well as overall, monitoring system and plan performance to meet AMS II. K. Version 02.0 requirements. - Disseminate lessons learned and good practice across the SSC-CPAs under the PoA (develop and share good practices) and assist in incorporating them to existing CPAs as well as ensuring they are considered at the design stage of new CPA
Specialist CDM Services company Quality control	• Conduct audits • Identify opportunities to improve the programme's operation and discuss improvement actions with the CME and SSC CPA implementer staff involved. • Communicate results • Revise procedures/role out improvements to other CPAs as appropriate (in conjunction with PoA Manager)
SSC-CPA Implementers	• Undertake Trigeneration/Cogeneration Feasibility Study • Financial closure • SSC - CPA implementation (construction, operation, and maintenance of the Trigeneration/Cogeneration System) • Implementation of the SSC-CPA monitoring plan as described in the SSC-CPA- DD The SSC-CPA implementer is free to make arrangements to outsource specific tasks to Third Party Service providers (eg. technology suppliers, , etc), but is ultimately responsible for ensuring the correct implementation of such tasks., in particular that relating to the implementation of monitoring plan contained in the relevant CPA-DD

CES Carbon Services Ltd is however the entity that is ultimately responsible for ensuring that all CDM requirements are met. The above are services that are provided regardless of who the CPA implementer may be. Joint ventures with leading companies in the Middle East have been set up to assist in promoting Trigeneration and Cogeneration energy solutions and overcoming other barriers that hinder the uptake of the technology. The PoA is open to other potential SSC CPA implementers wishing to implement trigeneration system in the host countries covered by the PoA.
In addition to the above management tasks, the CME, CES Carbon Services Ltd. will implement the following CDM operational elements to ensure proper management and oversight of the proposed PoA.

b) *Records for arrangements for training and capacity development of personnel.*

During the initial stages of the PoA role out, staff from the team that has developed this PoA and prepared the relevant documentation will be involved in ensuring that new SSC CPAs seeking inclusion in the PoA meet the eligibility and applicability criteria set out in the latter.

In due course, and when deemed appropriate by the CME, additional staff shall be trained.

Training and capacity development activities for the CME will be carried-out to ensure that the new CPA Manager(s) are fully qualified to implement this PoA and that they are familiar with the EB latest guidelines related to PoA development, CPA inclusion, monitoring and verification.

The training and capacity development activities for the CME staff shall be carried-out by experienced PoA South Pole Carbon Asset Management staff and will include but will not be limited to the following aspects:

- The eligibility and applicability checks that need to be carried out,
- The additionality assessment,
- The baseline estimation, and
- The monitoring guidelines and requirements
- Other aspects related to the SSC CPA's CDM project development cycle up to the point of its inclusion in the PoA

The approach that is deemed best suited to deliver such training is an *on the job –learning by doing* training approach. In this approach the trainee is trained by actively participating in:

- assessing whether a proposed SSC CPA complies with the eligibility and applicability criteria presented in the PoA
- writing the SSC CPA DD
- collating and preparing the relevant supporting documentation required when undertaking the above tasks
- engaging the DOE during the SSC CPA's validation process.

Staff to be trained in the above will also be expected to meet certain qualification requirements as specified by the CME in the CME Management System Manual provided to the DOE.

a) *Procedures for technical review of inclusion of CPAs*

The country PoA manager and CPA manager are both responsible for undertaking the technical review of inclusion of the CPAs. Each SSC CPA will have a CPA Manager assigned to it.

The CPA manager, before recommending the SSC CPA for inclusion, must perform a detailed technical review of the potential CPA. All necessary documents to demonstrate compliance with the eligibility and applicability criteria of the PoA are collected and verified by the CPA manager. The CPA manager also has the responsibility for collecting all the required information and supporting evidence for the CPA-DD. The CPA manager shall resort to technical experts to check that the proposed SSC CPAs technical specifications and other relevant technical features comply with the relevant technical eligibility and applicability criteria. Similarly and as required, the CPA manager may seek support from a CDM consultants to assess compliance of the proposed SSC CPA with other, CDM specific eligibility and applicability criteria.

After performing a detailed technical review, the CPA manager will compile the information and the results of the review in the form of a technical report concluding whether the CPA is eligible to be included in the PoA.

The country PoA manager will do a final check and sign off for inclusion of the CPA and ensure that all necessary documents for the compliance check have been collected and verified. Once this process has been completed the documentation shall be presented to a DOE for validation.

All information pertaining to the CPA is stored in CES Carbon Service's shared folder system. The CPA manager will also be required to update the main PoA database with the CPA.

d) A system/procedure to avoid double accounting e.g. to avoid the case of including a new CPA that has been already registered either as a CDM project activity or as a CPA of another PoA,

The CME will confirm as per EB 55 Annex 38, paragraph 6(i), that a SSC CPA that is to be included in the PoA is not registered as a CPA in another PoA nor is registered as a SSC CDM project activity in order to avoid a situation that could lead to double counting of the emissions reductions by means of the following procedure:

1. Every new SSC CPA will be compared to the already existing database and the list of similar project activities that are under validation or registered at the UNFCCC.
   v.
2. SSC CPA project implementers seeking to include their SSC CPA in the PoA will be made aware of the double accounting principle and will certify that the proposed CPA is neither registered under the Clean Development Mechanism of the UNFCCC.

e) Records and documentation control process for each CPA under the PoA

A record keeping system will be set up by the CME in order uniquely identify each SSC CPA cogeneration or trigeneration facility:

In order to unambiguously identify each cogeneration/trigeneration participating in the SSC PoA a serial numbering system will be implemented and key characteristics of the SSC CPA recorded that enable it to be clearly identified and differentiated from other project activities in the geographical boundary of the PoA that involve the use of similar technologies. The Record Keeping System will contain the following information:

- Name of the CPA
- The name, address, and project owner details of each participating CPA
- The geographical coordinates of each CPA (GPS coordinates of the building)
- Commissioning date
- Number of key energy producing units, Type of equipment (engine/turbine generator, absorption/electric chiller), Rating, Make, Model, Number as installed

CES Carbon Services Ltd will be responsible for the management of records and data associated with each SSC-CPA included in the record keeping system. The database will be updated manually using the data supplied by the SSC CPA Implementers and verified by the CME.

f) *Measures for continuous improvements of the PoA management system*

The management system is subject to a continuous review of its effectiveness, which is aligned with a Continuous Improvement Philosophy. Such review spans the various elements and any procedures. The

aim is to identify any shortcomings and correct them, as well as to seek to continuously improve the PoA's performance on all counts. All those involved are encouraged to raise any issues that they feel need to be corrected and suggest any means of improvement, and to communicate these to the AESB PoA Manager. The AESB PoA manager will then allocate resources and appoint the relevant staff, bearing in mind the nature of issues raised, to ensure that solutions are designed, tested and their effectiveness monitored, prior to being formally adopted.

Hence all systems elements and procedures are subject to being revised in order to improve the performance of the PoA to ensure that the CDM requirements and objectives of the PoA are met.

In addition to the above management tasks, the CME, CES Carbon Services Ltd. will implement the following CDM operational elements to ensure proper management and oversight of the proposed PoA.

(i) The SSC-CPA included in the PoA is not a de-bundled component of another CDM programme activity (CPA) or CDM project activity.

The de-bundling check will be performed pursuant to the *Guidelines on Assessment of De-bundling for SSC Project Activities* issued on the EB54 Annex 13. A SSC CPA shall be deemed to be a de-bundled component of a large-scale activity if there is already an activity, which satisfies both conditions (a) and (b) below:

(a) Has the same activity implementer as the proposed SSC CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same technology/measure, and;

(b) The boundary of the SSC CPA seeking inclusion in the PoA is within 1 km of the boundary of the proposed small-scale CPA, at the closest point.

If the proposed SSC CPA is deemed to be a debundled component in accordance with paragraph 2 of the above mentioned guidelines, but the total size of such a CPA combined with a registered SSC CPA of a PoA or a registered CDM project activity does not exceed the limits for SSC CDM project activities as set out in Annex II of the decision 4/CMP.1, the proposed SSC CPA can qualify to use the simplified modalities and procedures for small scale CDM project activities.

Only those PoAs that are (i) in the same geographical area and (ii) use the same methodology as the PoA to which the proposed CPA is added, need to be considered in assessing debundling.

The Record Keeping system mentioned in e) will also be used to perform the de-bundling check. Every new SSC CPA will be compared against the already existing list of project activities under-validation or registered at the UNFCCC. The database will include such project activities too. Moreover, as shown below, the project implementers will be made aware of the de-bundling rules and will certify that the proposed CPA is not a de-bundled part of a large scale project activity.

Further discussion concerning compliance of a SSC CPA with the criteria that it must not be debunlded component of a large scale project activity shall be provided in the corresponding SSC-CDM-PoA-DD.

(ii) The provisions to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA;

In order to avoid situations that could lead to double counting and to ensure that the Implementers of the SSC CPAs are aware of and have agreed that their activity is being subscribed to the PoA the implementing entity, the potential SSC CPA implementer shall provide a written statement or statements confirming the following:

- That the CPA implementing entity certifies that the CPA has not been and will not be registered as a single CDM project activity nor as a CPA under in another PoA under the UNFCCC's CDM or any Voluntary Carbon scheme.
- The implementing entity is aware that the SSC CPA will be subscribed to the present PoA.
- The implementing entity (has not) is not (and will not) undertake another cogeneration/trigeneration project within one kilometre of the proposed SSC CPA.
- The implementing entity cedes its rights to claim and own emission reductions under the UNFCCC's Clean Development Mechanism[7]or any voluntary scheme to the CME. This provision shall not apply if the entity implementing the SSC CPA is the CME.

Using the information that enables the unique identification of each participating cogeneration / Trigeneration facility to be established, the CME will confirm that a facility has not already been registered or entered validation as a CDM project activity or as a CPA of another PoA. Should such a situation occur, the coordinating entity will not proceed with the inclusion of the SSC CPA in the PoA.

SECTION D. Duration of PoA
D.1. Start date of PoA
>>
Start date of the PoA is 06/03/2012, which is the date when the PoA was submitted for Global Stakeholder Consultation.

D.2. Length of the PoA
>>
28 years

SECTION E. Environmental impacts
E.1. Level at which environmental analysis is undertaken
>>
1. Environmental Analysis is done at PoA level ☐
2. Environmental Analysis is done at SSC-CPA level ☑

-

The PoA consists of construction and operation of Trigeneration and Cogeneration systems in new and existing buildings. Due to the site specific nature of each SSC CPA, the environmental analysis shall be conducted at SSC-CPA level (see Section C3).

E.2. Analysis of the environmental impacts
>>
The analysis of environmental impacts, including transboundary impacts, will be conducted at CPA level.

In accordance with host Party laws/regulations the SSC CPAs promoted under the PoA an environmental impact assessment need not be conducted nor submitted as long as the projects are at the preliminary feasibility stage.

[7] The CME may also be a Implementing entity and is excluded from this requirement

SECTION F. Local stakeholder comments

F.1. Solicitation of comments from local stakeholders

>>

1. Local stakeholder consultation is done at PoA level ☐
2. Local stakeholder consultation is done at SSC-CPA level ☑

Note: If local stakeholder comments are invited at the PoA level, include information on how comments by local stakeholders were invited, a summary of the comments received and how due account was taken of any comments received, as applicable.

Due to the site specific nature of the SSC CCPAs comments from Stakeholders are invited at SSC-CPA level.

F.2. Summary of comments received

>>

Not applicable. Comments from local stakeholders will be invited at CPA level.

F.3. Report on consideration of comments received

>>

Not applicable. Comments from local stakeholders will be invited at CPA level.

SECTION G. Approval and authorization

>>

Host Country	**Letter approval and authorization**
Kingdom of Saudi Arabia (host)	CES LoA – Advanced Energy Solutions for Buildings
Oman (host)	Oman_LoA_Trigeneration
Egypt (host)	Declaration_Omnia_Egypt

Part II. Generic CPA for Trigeneration projects

PART II. Generic component project activity (CPA)

SECTION A. General description of a generic CPA

A.1. Purpose and general description of generic CPAs

>> The SSC-CPA is a trigeneration project implemented by << name of SS CPA Implementer>> under the “Advanced Energy Solutions for Buildings. Programme of Activities (PoA)” coordinated by CES Carbon Trading Ltd.

The trigeneration system is to be built in the << name of the building>>. The<<name of the building>> is a <<new/existing delete as appropriate>> construction that comprises << describe the service that the building provides>>and <<is to be built in / that has been built in (delete as appropriate)>> in the << name of city >>.

The trigeneration project aims to meet the<< name of site where the project is to be built>>’s <<power, space cooling and heat requirements (indicate which of these services are produced)>>in a more energy efficient and less carbon intensive way than a <<conventional system typically would have / the existing

systems would have (delete as appropriate>>, in which electricity requirements would have been met from the << indicate source from which the electricity that the SSC-CPA produces would have otherwise come from>>, space cooling requirements would have been met using << indicate how the cooling produced in the SSC-CPA would have otherwise been produced>> and <<hot water /steam (delete as appropriate>>) would have been generated using << indicate technology that would have been otherwise used to produce hot water /steam>>.

The proposed scheme includes the installation of the << indicate technology and energy source used to generate electricity in proposed SSC-CPA>> to produce the electricity required by the building. Waste heat from the power plant is used as a source of heat to run <<type of chiller and working fluid used>>absorption chillers which are to produce the chilled water required to meet the buildings space cooling requirements. A portion of the waste heat is also to be used to produce<< hot water/steam/additional electricity (delete as appropriate)>>. << If new, high efficiency electric chillers are also to be installed as part of the SSC CPA indicate the type of refrigerant used and whether such chillers are an integral part of the trigeneration system's design or used as a backup>>. The resulting combination of technologies leads to significant savings in energy and GHG emissions.

The proposed SSC-CPA prevents a more carbon intensive system to be installed at << name of the site where the proposed SSC-CPA is to be built>>, and is estimated to result in the reduction of <<>>tCO_2/yr.

The SSC-CPA is to be implemented as a << indicate the business modality under which the proposed SSCCPA is to be developed, i.e. as ESCO service, EPC contract etc>>, whereby << name of the proposed SSC-CPA Implementer>>is paid for the electricity, cooling and heat it provides to the owner of the building.

The project contributes to the achievement sustainable development goals in the <<name of host country>>:

Diversification of and conservation of energy sources

- The SSC CPA introduces more efficient forms of meeting electrical power, space cooling and hot water needs in commercial and institutional buildings.

- Cooling loads in buildings in << name of the host country>> are very large, and constitute the single most important energy load in buildings. The SSC CPA introduce an energy efficient building solution that involves amongst other features the production of chilled water by means of << indicate the cooling technology applied>>. The installation of the proposed system is expected to reduce the amount of energy that would have otherwise have had to been used to meet the building's energy needs, by approximately <<>>GWh/yr, thus saving fossil fuels that would have otherwise have had to been consumed to generate such energy.

Economic sustainability

The SSC CPA will contribute to the employment by providing opportunity of new jobs for local community starting from construction to commissioning, and thereafter throughout the ongoing operation and maintenance of the a highly advanced building energy solution.

The SSC CPAs to be implemented under the PoA are optimized energy solutions that require highly trained staff to operate and maintain them. CES Carbon Services Ltd will ensure that staff involved in the operation of such installations receive the necessary training to perform their duties.

Each SSC CPA will act as a clean technology showcase and should serve to encourage building designers, constructors, owners and operators to consider such schemes as a means of meeting a building's energy requirements in a more efficient and less carbon intensive manner.

Social sustainability

The PoA will implement advanced energy solutions which will be operated and maintained to ensure the safe operation of such installations. SSC CPAs will create jobs and will serve as examples of advanced efficient technological solutions which can be replicated in other parts of the country. The SSC CPAs serve as a means to foster a greater understanding of the practical aspects surrounding the operation of advanced energy, cooling and heating building solutions under local conditions. Local Higher Education entities will be able to access these installations via guided tours to enhance their practical understanding of advanced energy, cooling and heating solutions.

Environmental sustainability

The SSC-CPA introduces less greenhouse gas intensive form of meeting the<< electrical power, space cooling and hot water needs (indicate which are applicable) >> in << name of site where the proposed SSC-CPA is to be built >>by reducing the amount of energy needed to provide them. The trigeneration system to be implemented will reduce the amount of energy that would have otherwise been used to meet the << name of the site where the proposed SSC-CPA is to be built >>'s energy needs by reducing the amount of power drawn from << the grid or/and captive fossil fuel fired systems (delete as appropriate) >> and thus reduce the amount of CO2 emissions, as well as other pollutants resulting from the combustion of the fossil fuel that is saved and which would have otherwise have had to been used, are also reduced as result.

Cooling loads in << host country name>>are large, and constitute the single most important energy load in buildings. The trigeneration system introduces efficient and low carbon<< indicate the cooling technology used >>.It will reduce the amount of energy that would have otherwise been used to meet the << name of the site where the proposed SSC-CPA is to be built >>'s energy needs by harnessing the waste heat to provide cooling <<and hot water/steam/additional power (delete as appropriate)>>. In so doing the project reduces the amount of the emissions that would have otherwise been produced to meet the building site's electrical, cooling <<and hot water/steam/>> loads. Moreover, this same reduction in fossil fuels leads to a reduction in emissions of other gaseous pollutants that result from the combustion of fossil fuels.

Technology sustainability

<<name of the SSC CPA implementer>>has expertise in building and operating<tri-generation system. The << name of the site where the proposed SSC CPA is to be installed>> will be fitted with a modern tri-generation system that will serve also to showcase the technology, as one which is more efficient and less greenhouse intensive than the systems that are commonly installed in the similar buildings in the <<name of the host country>>, but which is also a reliable proposition. The project will contribute to raising awareness to the advantages of the technology and build up confidence in the market about to the benefits that result from the implementation of high efficiency and low carbon solutions.

The project will provide an opportunity for local people to acquire know-how for the optimal

maintenance and operation of state-of-the-art tri-generation systems, as the case may be; and

The project will contribute to provide opportunity of technology transfer.

SECTION B. Application of a baseline and monitoring methodology

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

>> Referring to the UNFCCC CDM web-site, as per appendix B to the simplified modalities & procedures for small scale project activities, the sectoral scope, type and category and methodology applicable to SSC CPAs developed under the proposed PoA are:

Sectoral scope : 03
Type : Type II – Energy Efficiency Improvement Projects
Category : AMS II K, *"Installation of co-generation or tri-generation systems supplying energy to commercial buildings"*.

Any SSC CPA will also apply the following tools and guidelines, as per the requirements of AMS II K / Version 02.0:

"*Tool to determine the remaining lifetime of the equipment" (Version 01)*

"General Guidelines to SSC CDM methodologies" (Version 19)

"*Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (Version 02)*

"*Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01)*

"Consolidated baseline and monitoring methodology for fuel switching from coal or petroleum fuel to natural gas" ACM0009/ Version 03.2

B.2. Application of methodology(ies)

>>

Table B.2.1 Trigeneration SSC CPA Compliance with AMS II K Version 02.0 Applicability criteria

The applicability criteria of AMS II K. Version 02.0.	**How each SSC-CPA complies to AMS II. K and the means whereby this can be confirmed depending on the Project Scenario Type that the SSC-CPA implements:**	
1. This methodology applies to the installation of fossil fuel based tri-generation facilities that simultaneously produce electricity and cooling (e.g., chilled water) and heating (e.g., steam or hot water) for supplying such energy to commercial, non-industrial, buildings.	1. <<>>	Project description and simplified schematic as described in the SSC - CPA DD
2. The methodology is applicable to installation of new trigeneration systems that replace or supplement either: the operation of (a) existing	2. <<>>	Project description and schematic as described in the CPA DD

systems that supply electricity (grid or on-site generation) and cooling (e.g., chillers) and heating systems (e.g., boilers) or (b) electricity and cooling and heating systems that would have been built and utilized.		
3. The methodology does not apply to the replacement of tri-generation systems.	3.<<>>	[Choose the applicable project scenario type and delete the text corresponding to other scenario type] Project scenario Type 1. Not applicable, hence no evidence is required to confirm compliance Project scenario Type 2. Drawings of the existing facilities and signed declaration from the CPA Implementer
4. If it is identified that the baseline situation is the continued use of an existing system then the existing system must have been in operation for at least the immediately prior three years, to the start date of the project activity, in order to ensure that adequate baseline performance data are available	4. <<>>.	[Choose the applicable project scenario type and delete the text corresponding to other scenario type] Project scenario Type 1. Not applicable –no evidence required Project scenario Type 2. Plant log book data or other plant reports, e.g. maintenance records, that show that the building's energy system have been in operation at least for the last three years counting back from the start date of the proposed SSC-CPA.
5. This methodology only applies to commercial, non-industrial applications. Projects that comprise energy efficiency measures implemented through integration of a number of utility provisions (for example, integrating power, steam/heat and cooling systems) of an industrial facility cannot apply this methodology.	5.<<>>	[Choose the applicable project scenario and delete the text below corresponding to other scenario type the not applied scenario] Project Scenario Type 1: Feasibility study or Construction plans or simplified drawings or project promotional brochures describing the building's application.

		Project Scenario Type 2: Publicly available literature describing the building, eg. brochures, advertisements, drawings, etc
6. For the purpose of this methodology, natural gas is defined as a gas which consists primarily of methane and which is generated from (i) natural gas fields (non-associated gas), (ii) associated gas found in oil fields. it may be blended up to 1% on a volume basis with gas from other sources, such as, *inter alia*, biogas generated in biodigesters, gas from coal mines, gas which is gasified from solid fossil fuels, etc.[8]	6. <<>>	<<Not applicable given that as per (insert reference) natural gas will not be used in the proposed SSC-CPA / As per (insert reference) natural gas is blended with gas from other sources, that the concentration of gas from such sources does not exceed 1% on a volume basis >>
7. Any chilled water/cooling, steam/hot water/heat and electricity produced by the trigeneration system must be used on-site (within the project boundary) to meet all or part of the energy demand. Existing chillers, boilers, electrical heaters, electricity generating units, etc. may remain in operation after the implementation of the project activity to either (a) supply the balance of the demand not met the trigeneration systems if the trigeneration system has insufficient capacity to supply the total energy demand and/or (b) provide backup to the trigeneration facilities. However, emission reductions can only be claimed for the cooling, heat and electricity produced by the new trigeneration system.	7. <<>>	[Choose the applicable project scenario type and type delete the text below corresponding to the other scenario type] Project Scenario Type 1. Not applicable. In the case of SSC-CPAs pursued in buildings that are yet to be built no equipment exists. Project Scenario Type 2. Log book information to show that the existing plant is in operation. Utility drawings of the existing system showing the points where the trigeneration system components tie into.<< If the chilled water to be produced by the proposed SSC-CPA is to share an existing chilled water distribution piping network, please show where the proposed system would it tie into the existing one. T he same applies to any heat being generated by the trigeneration system.>>
8. The energy savings caused by a single project activity may not exceed the equivalent of 60 GWh per year.	8. The Proposed SCA-CPA results in equivalent energy savings of <<>>GWh/yr.	Energy savings calculations presented by the CME or by project CPA implementer but

[8] This limitation is included because the methodology does not provide procedures to estimate the GHG emissions associated with the production of gas from these other sources. Project activities that use gas that does not comply with this definition must apply for a revision of the methodology.

A maximum saving of 60 GWh is equivalent to maximum savings of 60 GWh_e of electricity consumption or maximum savings of 180 GWh_{th} of fuel consumption, i.e., for calculation of maximum savings allowable per year, 1 GWH_e equals 3 GWH_{th}.		revised by the CME
9. The project activity can include installation of cooling equipment which use refrigerants only if such refrigerants have no ozone depleting potential (ODP) and if such installation is not mandated by laws or regulations.	9. The Proposed SSC CPA involves the use of <<>> chillers, which have no ODP	Cooling Equipment design specifications, feasibility study.
10. In case the produced electricity, cooling and/or heat are delivered to a facility that is not owned or under the control of the project owner, a contract between the project owner and consumer of the energy must be in force, during the crediting period, specifying that only the facility generating the energy can claim CERs from the emissions displaced by the subject project.	10. <<>>	Agreement between the-CPA Implementer, and the << name of the purchaser of the energy produced by the SSC CPA >>

B.3. Sources and GHGs

>> The gases and sources relevant to the Project are listed below based on the methodology AMS II version 02.0.

Table B.3.1 Summary of Gases and Sources included in project boundary

	Source	Gas	Included?	Justification / Explanation
Baseline	Grid/Captive power plant Electricity generation	CO_2	Yes	Main Emission source. CO_2 emissions from the combustion fossil fuel in grid connected and/or captive power plants to produce the electricity used to meet the building's electricity demands excluding emissions associated with the power needed to run the chiller plant in the absence of the project activity.
		CH_4	No	Excluded for simplification and conservativeness. Expected to be minimal
		N_2O	No	Excluded for simplification and conservativeness. Expected to be minimal
	Chilled water plant	CO_2	Yes	Main Emission source. CO_2 emissions from the

				combustion of fossil fuel in the grid connected and/or captive power plants to produce the electricity used to run the chiller plant in the absence of the project activity.
		CH_4	No	Excluded for simplification and conservativeness. Expected to be minimal
		N_2O	No	Excluded for simplification and conservativeness. Expected to be minimal
	Hot water production	CO_2	Yes	<< Choose as applicable: Not applicable / Main emission source. CO_2 emissions or associated with the electricity which is used or assumed to be used, to produce hot water>>
		CH_4	No	<< Choose as applicable: Not applicable / Excluded for simplification and conservativeness. Expected to be minimal>>
		N_2O	No	<< Choose as applicable: Not applicable / Excluded for simplification and conservativeness. Expected to be minimal>>
	Steam production	CO_2	Yes	<< Choose as applicable: Not applicable / Main emission source. CO_2 emissions from the combustion fossil fuel used to produce steam.>>
		CH_4	No	<< Choose as applicable: Not applicable / Excluded for simplification and conservativeness. Expected to be minimal>>
		N_2O	No	<< Choose as applicable: Not applicable / Excluded for simplification and conservativeness. Expected to be minimal>>
Project Activity	Trigeneration power plant fossil fuel combustion	CO_2	Yes	Main emission source.CO_2 emissions from combustion of<< fossil fuel used >> name used by the Trigeneration system's power plants as per the "Tool to calculate project or leakage CO_2emissions from fossil fuel combustion"
		CH_4	No	Excluded. Expected to be minimal
		N_2O	No	Excluded. Expected to be minimal
	Electricity consumed by the Trigeneration system that is sourced from the grid	CO_2	Yes	Main Emission source. CO_2 emissions from << describe source >><<, and calculated as per the tool to calculate baseline, project and/or leakage emissions from electricity consumption (if applicable; otherwise delete this last sentence)>>.
		CH_4	No	Excluded. Expected to be minimal
		N_2O	No	Excluded. Expected to be minimal
	Physical leakage of refrigerant from new cooling equipment	Refrigerants that are GHGs	Yes	Emissions from this source are to be included if a new chiller uses a non ODP refrigerant with a GWP greater than cero

The SSC-CPA is to be implemented in the City of << name of city where the SSC-CPA is to be built>>, which is located in the << host country name >> and thus, in the geographical boundary of the PoA as shown in the figure below.

Figure 3 Location of the proposed SSC-CPA in relation to the Geographical Boundary of the PoA

<< insert host country map showing location of the proposed SSC CPA>>

B.4. Description of baseline scenario

>> The SSC-CPA introduces a Trigeneration system, either in buildings that are yet to be built or buildings that already exist. There are thus two types of Project Scenarios that are catered for by the proposed PoA .

The baseline scenario for any SSC CPA can be described in terms of a combination of the following:

a) A source of electricity, which is typically imported from the grid and/or produced by an onsite captive power plant
b) A means of providing space Cooling (e.g, chilled water) is produced in a vapour compression system driven by electricity
c) A means of providing heat (eg. in the form of hot water or steam) which is produced using fossil fuel or electricity

For each of the two types of project scenarios mentioned above, AMS IIK Version 02.0 describes how the baseline scenario for the purpose of establishing what the emissions would have been is to be identified and what form such baseline scenarios take.

SSC CPA implementers shall indicate in the SSC-CPA DD which Project Scenario Type their SSC-CPA conforms to:

Project Scenario Type 1 SSC CPA: The SSC CPA replaces systems that would have been built

In this project scenario a new trigeneration system replaces the operation of electricity, cooling and heating systems that would have otherwise been built. In this case, a "Reference Plant" is to be defined as the system that would have otherwise been built and thus constitutes the baseline scenario for the purpose of determining the baseline emissions, in accordance with AMS II.K/Version 02.0.

Such a "Reference plant" is based on what is considered to be common practice for cooling and heating systems of similar capacity and sources of electricity used in the same commercial sector. Such a reference plant shall be taken as the basis upon which to determine the baseline emissions for this Project Scenario Type.

Baseline Reference plant

As per AMS II.K Version 02.0, in cases where the baseline scenario consists of the installation of new cooling and /or heating systems and/or the utilisation of new electricity sources, a baseline Reference Plant shall be defined as the baseline scenario for the purpose of establishing the baseline emissions. The Reference Plant is based on common practice for similar capacity, new heating and cooling systems and sources of electricity in the same commercial sector and in the same country or region as that of the proposed SSC CPA. The identification of the Reference Plant should exclude plants implemented as CDM project activities.

The common practice analysis used to determine the Reference Plant considers sources and equipment/systems that provide similar outputs and services and that are in compliance with relevant regulations that would have been installed otherwise in the host country, and which shall include:

Host country: Kingdom of Saudi Arabia

Source of electricity:

The source of electricity to meet the building's power needs: the electricity grid

Technology used to provide space cooling:

The technology used to provide chilled water in new Air Conditioning System plant in commercial applications in the Kingdom of Saudi Arabia comprise:

- Electrically driven vapour compression air cooled chillers
- Split AC systems

This is based on CES Energy's knowledge of the sources of energy and technologies used in buildings in the Kingdom of Saudi Arabia and has been confirmed by engineering consultants active in this market[9]. For the sake of simplicity and conservativeness in the determination of the baseline emissions, it is assumed that electrically driven chillers are used as the baseline reference space cooling technology in the Kingdom of Saudi Arabia given their higher COP compared to Split systems. Moreover, the highest full load COP provided by two or more manufacturers for chillers commonly used in the Kingdom of Saudi Arabia has been taken as the COP of the cooling technology that is part of the Baseline Reference Plant

Technology used for supplying hot water in new hot water systems:

Common practice in the kingdom of Saudi Arabia is the use of electrical heaters.

Technology and source of energy used to generate steam

Common practice in the kingdom of Saudi Arabia is the use of Diesel fuel fired boilers

Host country: Oman

Source of Electricity

The source of electricity to meet the building's power needs: The electricity grid.

Technology used to provide space cooling:

The technology used to provide space cooling in commercial applications in Oman consists of electrically driven vapour compression air cooled chillers and split AC systems. For the sake of simplicity and conservativeness in the determination of the baseline emissions, it is assumed that electrically driven chillers are used as the baseline reference space cooling technology in Oman given their higher COP compared to Split systems

Technology used for supplying hot water in new hot water systems:

Common practice in Oman is the use of electric heaters

Technology and source of energy used to generate steam:

[9] MTMM Engineering Consultants. Jeddah 21423, Kingdom of Saudi Arabia. Dec 2011

Common practice in Oman is the use of diesel fuel fired boilers

The above is confirmed by Mohamed A. Turki Mott Mac Donald MTMM Engineering Consultants who are active in this market[9] and air conditioning manufacturers Daikin McQuay's Middle East [11]

Host country: Egypt

Source of Electricity

The source of electricity to meet the building's power needs: The electricity grid

Technology used to provide space cooling:

The technology used to provide space cooling in commercial applications in Egypt consists of electrically driven vapour compression air cooled chillers and split AC systems. For the sake of simplicity and conservativeness in the determination of the baseline emissions, it is assumed that electrically driven chillers are used as the baseline reference space cooling technology in Egypt given their higher COP compared to Split systems.

Technology used for supplying hot water in new hot water systems:

Common practice in Egypt is the use of electric heaters

Technology and source of energy used to generate steam:

Common practice in Egypt is the use of diesel fuel fired boilers.

The above is confirmed by Mohamed A. Turki Mott Mac Donald MTMM Engineering Consultants who are active in this market [9] and Cgroup (electro mechanical consultant) Engineering Consultancy[10].

For the sake of simplicity and conservativeness in the determination of the baseline emissions, it is assumed that electrically driven chillers are used as the baseline reference space cooling technology in the above countries given their higher COP compared to Split systems. Moreover, the highest full load COP provided by two or more manufacturers for chillers commonly used in each of these countries has been taken as the COP of the cooling technology that is part of the Baseline Reference Plant

Project scenario Type 2 SSC CPAs: the CPA replaces/supplements the operation of existing systems that supply electricity (grid or onsite generation) and cooling (eg. chillers) and/or heating systems (e.g hot water boilers).

In this Project Scenario Type, the Trigeneration system that is to be installed replaces/supplements the operation of existing systems that supply electricity (grid or onsite generation) and cooling (eg. chillers) and/or heating systems (e.g hot water heaters or steam boilers).

[10] Cgroup (electro mechanical consultant) Engineering Consultancy, Nasr City, Egypt

The baseline scenario for this project scenario type is defined in accordance to AMS II.K/Version 02.0 as being one of the two following options:

Option a) The continued operation of the existing systems may be selected as the most plausible option for the purpose of determining the baseline emissions:

i) If the total consumption of energy (electricity, cooling and heating) by the commercial buildings that consume this energy does not increase by more than 20% from the established baseline values, i.e., the annual energy consumption during the crediting period shall not be 20% higher that the historical values of energy consumed by the consumers. If such condition is met then the baseline emissions shall be established from the characteristics of the existing systems, using data from the immediately prior three years (to the date of the project start up)

ii) If during the crediting period, the total annual consumption of energy (electricity, cooling and heat) does increase by more than 20% with respect to the established baseline values it can be demonstrated using the related and relevant procedures prescribed in the SSC general guidance that the most plausible baseline scenario for the supply of additional amounts of energy would be the continued use of the existing systems. This shall include demonstrating that the existing system has the capacity to meet that increased energy demand.

The stepwise approach to be followed in such cases is the following, based on the General Guidelines to SSC CDM methodologies (Version 17) EB61.

Step 1. Define alternatives available to the SSC CPA implementer that deliver the same quantities and quality of electricity, cooling and heat, including the proposed project activity undertaken without being registered as a CDM project activity under the PoA

This shall include:

- The existing system meeting the additional (incremental) demand for energy
- The existing system is replaced by the new and more efficient systems (the baseline reference plant)
- The existing system being replaced with a trigeneration system

Step 2. List the alternatives indentified per Step 1 that are in compliance with local regulations, and exclude from further consideration any alternative that is not in compliance with such regulations.

Step 3. Eliminate and rank the alternatives remaining in Step 2 taking into account barrier tests specified in EB 68 Annex 27. Guidelines on the Demonstration of additionality of small scale project activities. (Version 09.0)
The NPV of the costs for each alternative shall be presented, using the same approach described in Part I section B.1.

Step 4. If it is determined that the alternative to meet the incremental energy consumption with the least NPV cost is the continued operation of the existing systems then the characteristics of such systems can be used to determine the baseline emissions. Otherwise, the baseline Reference Plant as described above in the section titled "Baseline reference plant" that

corresponds to the host country in which the proposed SSC CPA is to be implemented shall be chosen as the baseline scenario.

iii) If it can be demonstrated that irrespective of what the baseline total annual energy consumption may have been or what the total annual energy consumption may be during the crediting period, that a new, more efficient system wouldn't have been installed in the absence of the project activity.

For example, if a new, more efficient system would have been installed as a result of the existing system reaching the reached the end of its useful life during the crediting period or because there is not sufficient information available to apply the "Tool to determine the remaining lifetime of equipment" to establish the point in time when the existing plant would have had to been replaced anyhow, then the continued operation of the existing system shall not be considered to be the baseline scenario. In such cases, the baseline scenario shall be the baseline Reference Plant as described above in the section titled "Baseline reference plant" that corresponds to the host country in which the proposed SSC CPA is to be implemented in .

The following stepwise approach shall be applied to establish if a new system might have been installed or not:

a) Determine the remaining lifetime of the existing system as per the "Tool to demonstrate the
remaining lifetime of equipment".

Existing systems will typically comprise a number of chillers, and in some cases, captive power plant generators, each with their own remaining lifetime. The remaining lifetime for each item of such items plant shall be presented in the SSC CPA DD. The point in time at which the existing systems would he replaced is determined conservatively [11] by establishing the earliest point in time at which any of the chillers or generators would have to be replaced be replaced anyhow, thus triggering the need to install a new system.

b) If the end of the crediting period of the SSC CPA lies before the point in time at which the system would have been replaced then the baseline scenario may be taken to be continued operation of the existing system subject to the conditions set out i) and ii) above.

Option b) The installation of a new, more efficient system or "Baseline Reference plant" shall be taken to be the baseline scenario for the purpose of determining the baseline emissions, if

a) It is determined that a new and more efficient system (as compared to the existing system) would have been installed in the absence of the project activity as per iii) above, or

b) The SSC-CPA implementer chooses to assume, in order to simplify the process of identifying the baseline scenario for the purpose of determining the baseline emissions (eg. due to the lack of sufficient information to demonstrate in line with the "Tool to

[11] As per the "Tool to determine the remaining lifetime of equipment", footnote 1: when the tool is applied to determine the remaining lifetime of baseline equipment for the use in calculation of baseline emissions, the lower value within the range shall be considered

determine the remaining lifetime of the equipment") that the existing systems would be replaced after the end of the crediting period and thus provide for greater conservativeness in the emissions reductions calculation, that the baseline scenario is the installation of a new and more efficient system. Such a more efficient system being defined in accordance to the approach provided in AMS II.K/version 02.0 to determine the baseline Reference Plant, as described above. In such case, the Baseline Reference Plant chosen shall be that which corresponds to the host country in which the proposed SSC CPA is to be implemented in, as described above in the section titled "Baseline reference plant" where the baseline reference plants for the various host countries considered in this PoA are presented.

SSC CPA implementers seeking to implement Project Scenario Type 2 SSC CPAs shall describe in Annex of 3 of the corresponding SSC CPA DD form which of the two options a) or b) above is to be taken as the baseline scenario

The identified baseline scenario for any of the two Types of SSC CPA conforms to the legal requirements of the host countries covered by the PoA. Moreover the installation of the project activity is not mandatory by any laws. i.e. the technologies that are currently used and which could continue to be used in existing buildings, or be installed in new buildings in the absence of the PoA all comply with the existing regulations. There is no restriction concerning the use of electric chillers to provide chilled water for cooling in buildings, nor is there any restriction in generating hot water or steam to meet a commercial building's heat requirements from electricity or fossil fuels, nor any impediment to sourcing power from the grid or from a captive power plant in any of the host countries considered in the PoA. Moreover, the installation of trigeneration systems in commercial buildings is not mandated by any laws in any of the host countries considered in this PoA.

B.5. Demonstration of eligibility for a generic CPA
>> The proposed SSC-CPA is eligible to be included in the Advanced Energy Solutions for Buildings. Programme of Activities because it meets all the relevant eligibility criteria laid out in Table B.2.1B.5.1below.

Table B.5.1 SSC-CPA Inclusion Eligibility Criteria Compliance

	Eligibility criteria	**How the SSC CPA meets the eligibility criteria and examples of Reference or supporting documentation that can provided to support such claim**
1	The Geographical boundary of the CPA shall be within the geographical boundary of the PoA	Geographical coordinates of the site where the SSC CPA is to be built showing its relation to the boundary of the PoA
2	The CPA implementer shall demonstrate that the project activity shall not lead to double counting of Emission Reduction by confirming that this project activity shall not be a part of any of the below mentioned categories post approval of the project activity under CDM: (1) Standalone CDM project activity, (2) Bundled CDM project activity, (3)	Information provided in the Record Keeping System and assessment of the information thereof, carried out in accordance

<table>
<tr><td></td><td>Another registered PoA.</td><td>with double counting avoidance check described in section A 4.4.1 *(iii)* of the PoA DD and described in the SSC CPA DD of the SSC CPA seeking inclusion in the POA.</td></tr>
<tr><td>3</td><td>Shall consist of fossil fuel based Trigeneration systems to supply electricity, cooling and/or heating in non-industrial buildings in which the main items of plant equipment where applicable shall comply with following specifications and certifications
<table>
<tr><th>ITEM</th><th>CAPACITY RANGE</th><th>CERTIFICATIONS REQUIRED</th><th>OTHER DETAILS</th></tr>
<tr><td>Fossil Fuel Fired Turbine</td><td>2 MW_e – 20 MW_e</td><td>Tested to ISO 2314:2009 (or equal and approved)
Electrical Efficiency to be > 20% on a NCV basis</td><td></td></tr>
<tr><td>Fossil Fuel Fired IC Engine</td><td>500 kW_e – 4 MW_e</td><td>Tested to ISO 3046 (or equal and approved)
Electrical Efficiency to be > 25% on a NCV basis</td><td>Hot water output temperature range 60°C – 120°C</td></tr>
<tr><td>Chiller</td><td>150TR – 4000TR</td><td>AHRI, ANSI, BS, EN, ISO or equal and approved</td><td>Chilled water temperatures from 0 °C to 10 °C</td></tr>
<tr><td>High Efficiency Electric Chillers</td><td>100-4000TR</td><td>AHRI, ANSI, BS, EN, ISO or equal and approved</td><td>Chilled water temperatures from -5°C to 15°C</td></tr>
<tr><td>Heat Recovery Steam Boiler</td><td>0.5 t/h – 25 t/h</td><td>PED 97/23/EC (or equal and approved)</td><td>Pressures in range 1 bar – 30 bar
Temperatures in range 120 °C – 400 °C</td></tr>
</table></td><td>Any of the following: Detailed project report, FSR, quotation from technology provider, purchase order, EPC, statement from the SSC CPA implementer, etc.</td></tr>
<tr><td>4</td><td>Start date of the CPA is not, or will not be, prior to the date on which the CDM-PoA-DD is first published for Global Stakeholder consultation</td><td>Any one of the following: EPC contract, equipment purchase order, unless such documentation does not exist because the SSC CPA has yet to start.</td></tr>
<tr><td>5</td><td>Meet baseline and monitoring methodology AMS II.K requirements as given in Section B.2 Table 1. for new and existing buildings</td><td>Please refer to Section B2. Table 1.</td></tr>
<tr><td>6</td><td>The proposed CPA is a voluntary initiative by the CPA implementer. The CPA implementer is not implementing a mandatory policy or regulation</td><td>Signed declaration by the SSC CPA implementer confirming that the measure is a voluntary</td></tr>
</table>

		(non mandatory) one, and third party documentation to confirm such claim (e.g from third party consultants or Govt. entities, etc).
7	The Project Pre Tax IRR of the proposed CPA based on parameters and sources given in Table B.5.2 must be less than the applied Pre Tax WACC benchmark based on the following parameters and sources presented in Table B.5.3 below	WACC (pre tax based) Benchmark Analysis presented as part of the corresponding CPA DD submission.

Parameters	Description	Example of Sources
RFR	Risk Free Rate in a mature equity market	U.S long-term government bond. Source: eg. http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2010
ß *unlevered*	Beta (unlevered)	Total Beta (*Unlevered*) from Damadoran (Stern University) for the relevant sector; most recent year data before the investment decision was made. Source: eg. ttp://pages.stern.nyu.edu/~adamodar/ "Total Beta by industry sector"
RP	Total Risk Premium	Source: http://pages.stern.nyu.edu/~adamodar/ "Risk Premium for other Markets"
SP	Size Premium.	Source. The Size risk premium can be sourced from the "*Ibbotson SBBI valuation yearbook"* published by Morningstar Inc
CD	Cost of Debt	The yield of a 10 year bond issued by the government of the Host country, if this is not available, the bond with the maturity which is closest to 10 years can also be used. The value of cost of debt can also sourced from the host country Central Bank or any other relevant evidences.
%Debt	% of finance from debt	Based on the finance structure of the project. If debt/equity finance structure is not yet available, 50% debt may be assumed As per EB 62, Annex 5, Para 17, 18
%Equity	% of finance from equity	Based on the finance structure of the project. If debt/equity finance structure is not yet available, 50% equity may be assumed As per EB 62, Annex 5, Para 17, 18
D/E	Debt to Equity ratio	Calculation
CE	Cost of Equity, ie Average expected return on equity	Calculated as per the CAPM eqn.
T	Tax rate	Host Country Tax regulation

This eligibility criterion is applicable to project scenarios in which the CPA implementer is a third party investor (e.g. a technology promoter,

	ESCO, etc) invests in the project and sells the electricity, cooling and heat that is produced, i.e. has the choice to make the investment or not). Additionality shall not be assessed by any of the other barriers listed in EB 68 Annex 27. Guidelines on the Demonstration of additionality of small scale project activities. (Version 09.0).	
8	There is an alternative, more GHG intensive means of meeting the building's electricity, cooling and heat requirements which has a lower NPV cost than that of the proposed CPA. This eligibility criterion is applicable to project scenarios in which the CPA implementer would have made an investment anyway). Additionality shall not be assessed by any of the other barriers listed in EB 68 Annex 27. Guidelines on the Demonstration of additionality of small scale project activities. (Version 09.0)	NPV Cost comparison analysis presented as part of submission of corresponding SSC CPA DD applying such approach.
9	An agreement shall be in place between the CPA implementer and the Coordinating and Managing Entity (CME), authorizing the CME to include the CPA into the PoA and therefore ceding the carbon rights to the CME.	ERPA or any other document signed between the SSC CPA implementer where the CPA implementer cedes the rights the carbon rights to the CME.
10	The proposed SSC CPA does not receive any Annex 1 parties funding, or if it does, such funding does not result in a diversion of official development assistance.	Written affirmation that if funds from Annex 1 funds are used, that such funding does not result in a diversion of official development assistance from the donor party.
11	The energy savings caused by a single project activity may not exceed the equivalent of 60 GWh per year. A maximum saving of 60 GWh is equivalent to maximum savings of 60 GWh_e of electricity consumption or maximum savings of 180 GWh_{th} of fuel consumption, i.e., for calculation of maximum savings allowable per year, 1 GWH_e equals 3 GWH_{th}.	Energy savings calculations presented by the CME or by project CPA implementer but revised by the CME
12	The Proposed SSC CPA is not a debundled component of a large scale activity. SSC CPA shall demonstrate compliance with the EB 54 Annex 13 "Guidelines on assessment of de-bundling for SSC project activities". The CPA is considered as debundled if both conditions (a) and (b) below are satisfied: a. Has the same activity implementer as the proposed small scale CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same technology/measure, and; b. The boundary is within 1 km of the boundary of the proposed small-scale CPA at the closest point.	Information provided in the Record Keeping System and assessment of the information thereof, carried out in accordance with debundling check procedure described in section A 4.4.1 *(iii)* of the PoA DD on the SSC CPA seeking inclusion

Assessment and demonstration of additionality of the small-scale CPA as per eligibility criteria listed in the Registered PoA

Define the SSC-CPA Project Scenario Type and business modality

For Project Scenario Type 1 SSC CPAs

ESCO modality

<<name of SSC CPA Implementer >>undertakes the investment in a trigeneration system (delete as appropriate>>in a building that has yet to be built and incurs in the ongoing cost of operating it. << SSC CPA implementer name>><< sells electricity, chilled water and heat in the form of hot water and/or steam to the site's consumers (describe services provided and delete the rest>>. << SSC CPA implementer name >>has the option to choose whether to make such an investment or not.

Hence, as described in Part I section B.1 of the PoA DD a Benchmark Approach is appropriate under such circumstances.

For Project Scenario Type 2 SSC CPAs

ESCO modality

<<name of SSC CPA Implementer >>undertakes the investment as an ESCO to introduce a trigeneration system in an existing building and incurs in the ongoing cost of operating it. << SSC CPA implementer name>><< sells electricity, chilled water and/or heat in the form of hot water and/or steam to the site's existing consumers (describe services provided and delete the rest)>>. << SSC CPA implementer name >>has the option, as any ESCO would, to choose whether to take on the associated risks and make such an investment or not.

Hence, as described in Part 1 section B.1 of the PoA DD a Benchmark Approach is appropriate under such circumstances.

Choice of and Calculation of financial indicator:

Additionality for the proposed SSC-CPA has been chosen to be demonstrated by calculating the project IRR, on a Pre Tax basis, and by showing first that the resulting IRR is below the benchmark, and that hence the proposed SSC-CPA is not a financially attractive option, and second, that variations in the values of key parameters that impact the project IRR that would lead to the IRR reaching benchmark are unlikely to materialise.

<<Table provides the project data and information used to calculate the Project IRR on a Pre tax basis>>.

Table B.5.2 Parameters for project Pre tax IRR

PROJECT DATA		
	Unit	**Comments/Examples of Sources**
Technical lifetime	<<Year>>	<<Estimation of technical lifetime based on information provided by technology providers or the Chartered Institution of Building Services Engineers.>>
Investment decision date	<<DD/MM/YYYY>>	<<Can be sourced from board decision, loan agreement or main equipment purchasing contract>>
Construction start date	<<Year>>	<<Can be sourced from. constructor quotation, Feasibility Study, Project Status Report or civil work contract>>
Date project starts operating	<<Year>>	<<Can be sourced from scheduled Commissioning date>>
FINANCIAL PARAMETERS		

	Unit	Comments/Examples of sources
Total amount of electricity sold	kWh/y	<<Can be sourced from. the project developer or Feasibility Study>>
Total amount of cooling sold	kWh/y	<<Can be sourced from the project developer or Feasibility Study>>
Total amount of heat sold	kWh/y	<<Can be sourced from the project developer or Feasibility Study>>
Electricity tariff	Local Currency unit /kWh	<<As per contract with electricity buyer when available or the rate that would have had to be paid for sourcing power from the grid.
Cooling Tariff	Local currency unit/kWh	<<Cooling supply agreement between the supplier and the off taker>>
Heat Tariff	Local currency unit/kWh	<<Heat supply agreement between the supplier and the off taker>>
Fuel price	Local currency unit/kWh	<<Can be source from Fuel supplier, supply contracts>>
Water rate	Local Currency/m^3	<<Water utility, supply contracts>>
Inflation rate	% per year	<<If not otherwise specified, annual change in consumer price index at date of investment decision is used. It can be sourced from the Central Bureau statistic or any relevant evidences>>
Exchange Rate	SAR/USD	<<FOREX, Host Country Central Bank's and other relevant websites or sources>>
COSTS AND EQUIPMENT		
	Unit	**Comments/Source**
Total investments	USD	<<If the construction is expected to take place over several years, a yearly breakdown of investments can be provided. The value can be sourced from the project developer design or feasibility study >>
Annual Operation & Maintenance cost	USD/year	<< For a new plant it can be sourced from. FE, Feasibility Studies or technology providers; for an existing plant it is sourced from maintenance contract invoices and energy invoices >>
(Other operating expenditure)	USD/year	<<>>
Insurance	% of Capex p.a.	<<Can be sourced from insurance quotation/contract>>

Applying the above data to the IRR model yields a **Pre Tax Project IRR** equal to**<<>>**%

Calculation of Benchmark

The Benchmark is calculated according to the approach described in the PoA and model provided. Parameters used to determine the WACC on a Pre Tax basis are provided in Table B.5 below.

Table B.5.3 Parameters for WACC calculation

Parameters	Description	Explanation and source	Reference
RFR	Risk Free Rate in a mature equity market	U.S long-term government bond is considered as risk free instrument. Bond rate is taken as the 6 month average prior to the investment decision and for a duration similar to the technical lifetime of the project activity	<<>>

		Source: e.g. http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2010	
ß *unlevered*	Beta (unlevered)	Total Beta (*Unlevered*) from Damadoran (Stern University) for the relevant sector; most recent year data before the investment decision was made. It reflects a firm's total exposure to risk rather than just the market risk component. It is a function of the market beta and the portion of the total risk that is market risk. These betas might provide better estimates of costs of equity for undiversified owners of businesses. Source: eg. http://pages.stern.nyu.edu/~adamodar/ "Total Beta by industry sector"	<<>>
RP	Total Risk Premium	The Total Risk Premium includes an Equity Risk Premium and a Country Risk Premium. The reason behind this premium stems from the risk-return trade off, in which a higher rate of return is required to entice investors to take on riskier investments. Source: eg:http://pages.stern.nyu.edu/~adamodar/ "Risk Premium for other Markets"	<<>>
SP	Size Premium.	Size premium is an investor's risk incurred when investing in a small project. Betas are generally calculated based on data for large corporations. However companies of different sizes face different levels of risk. The smaller the company the fewer the sources of capital and investors require additional returns to compensate for the lower marketability of shares. According to Ibbotson Associates' statistics for 2009 [12]for the New York Stock exchange reveals that risk premium increases as the size of a company reduces: The equity risk premium of the largest 10% of companies is -0.36% (i.e. the firms in the largest 10% have an equity risk premium that is 0.36% below average). The smallest 10% of companies (up to 128	

[12] Ibbotson SBBI 2009 Valuation Yearbook, Chapter 7, page 96

		million USD) have a risk premium of 5.81% in excess of that determined by the CAPM. The usual way of accounting for this risk premium is to add this to the Cost of Equity (CE), as given in the equation for CE above. The PP may be apply the SP in cases where project CAPEX is less than 100 million USD Source. The Size risk premium can be sourced from the "*Ibbotson SBBI valuation yearbook"* published by Morningstar Inc	
CD	Cost of Debt	As per EB61 Annex 13, Para 16.) If the WACC is based on parameters that are standard in the market, the cost of debt can be taken as the cost of financing in the capital markets, e.g. the host country commercial lending rate. The yield of a 10 year bond issued by the government of the Host country, if this is not available, the bond with the maturity which is closest to 10 years can also be used. The value of cost of debt can sourced from the Host Country Central Bank e.g. or any other relevant evidences. The choice and source shall be clearly indicated in the CPA- DD and shall reflect the cost of debt at the time of the investment decision taking	
%Debt	% of finance from debt	Based on the finance structure of the project. If debt/equity finance structure is not yet available, 50% debt may be assumed As per EB 62, Annex 5, Para 17, 18	<<>>%
%Equity	% of finance from equity	Based on the finance structure of the project. If debt/equity finance structure is not yet available, 50% equity may be assumed As per EB 62, Annex 5, Para 17, 18	<<>>%
D/E	Debt to Equity ratio	Calculation	<<>>
T	Tax rate	Host Country Tax regulation	<<>> %
Date of performing financial analysis	DD/MM/YYYY	Can be sourced from the date of the investment decision	<< >>/<<>>/<<>>

Applying the above data to the Benchmark calculation model results in a <<**Pre/Post Tax**>> **WACC** equal to**:** <<>>%

Investment analysis

As the above results show the Project Pre tax based IRR is less than the applied benchmark, therefore the proposed SSC CPA is not a financially attractive option for the investor to pursue.

<u>Sensitivity analysis</u>

As specified in the excel spreadsheet to be supplied to the DOE upon submission of a CPA DD, a sensitivity analysis has been conducted on variables that constitute more than 20% of either the total project costs or the total project revenues, and shall include the following variables: (1) total investment; (2) O&M, (3) Revenues (Electricity/Cooling/Heat energy sales) as described in the PoA DD.

Table B.5.4 Framework for reporting results of sensitivity analysis

Factor	**Variation**		
	-10% (or less if appropriate)	0%	10% (or more if appropriate)
Total investment	<<>> %	<<>> %	<<>>
O&M Cost	<<>> %	<<>> %	--
Revenues	<<>> %	<<>> %	<<>> %
Benchmark (WACC Pretax)	<<>>%		

The Project Pre Tax based IRR remains below the Benchmark under the scenarios considered. Hence, the proposed SSC-CPA is not a financially attractive investment for ESDM to pursue and the project is thus deemed to be additional.

For Project Scenario Type 1 SSC CPAs

Engineering, Procurement and Construction Modality

<<name of SSC CPA Implementer >>undertakes the investment in a trigeneration system in <<a building that has yet to be built >> . << SSC CPA implementer name >>has to incur in an investment anyhow to fit the building with the necessary facilities to meet the building's energy needs.

For Project Scenario Type 2 SSC CPAs

Engineering, Procurement and Construction Modality

<<name of SSC CPA Implementer >> introduces a trigeneration /system in an existing building. << SSC CPA implementer name >> is the << owner/entity (select as appropriate) >> responsible for keeping the existing system in proper operating condition and making sure the energy needs of existing consumers are met. In other words <<>> has to either continue to incur in expenditure to keep the existing systems running or has to investment in new equipment to replace these.

Choice of and Calculation of financial indicator:

As described in section B.1 of Part I of the PoA DD an Investment Comparison Analysis is to be carried out. The Net Present Value of the costs is the applicable financial indicator and is determined using the information and data provided in Table below.

Table B.5.5 Parameters for project Pre tax NPV of Costs

PROJECT DATA

	Unit	Comments/Source
Technical lifetime	<<Year>>	<<Estimation of technical lifetime based on information provided by technology providers or the Chartered Institution of Building Services Engineers >>
Investment decision date	<<DD/MM/YYYY>>	<<Can be sourced from board decision, loan agreement or main equipment purchasing contract>>
Construction start date	<<Year>>	<<Can be sourced from e constructor quotation, Feasibility Study, Project Status Report or civil work contract>>
Date project starts operating	<<Year>>	<<Can be sourced from scheduled Commissioning date>>
FINANCIAL PARAMETERS		
	Unit	**Comments/Source**
Total amount of electricity sold	kWh/y	<<Can be sourced from the project developer or Feasibility Study>>
Total amount of cooling sold	kWh/y	<<Can be sourced from the project developer or Feasibility Study>>
Total amount of heat sold	kWh/y	<<Can be sourced from the project developer or Feasibility Study>>
Electricity tariff	Local currency unit t/kWh	<<As per contract with electricity buyer when available or the rate that would have had to be paid for sourcing power from the grid.
Cooling Tariff	Local currency unit/kWh	<<Cooling supply agreement between the supplier and the offtaker>>
Heat Tariff	Local currency unit/kWh	<<Heat supply agreement between the supplier and the offtaker>>
Fuel price	Local currency unit/kWh	<<Can be source from Fuel supplier, supply contracts, invoices >>
Water rate	Local Currency/m^3	<<Water utility, supply contracts, invoices>>
Inflation rate	% per year	<<If not otherwise specified, annual change in consumer price index at date of investment decision is used. It can be sourced from the Central Bureau statistic or any relevant evidences>>
Exchange Rate	Local currency unit/USD	<< FOREX, Host Country Central Bank's or other relevant websites or sources >>
COSTS AND EQUIPMENT		
	Unit	**Comments/Source**
Total investments	USD	<<If the construction is expected to take place over several years, a yearly breakdown of investments can be provided. The value can be sourced from the project developer design or feasibility study >>
Annual Operation & Maintenance cost	USD/year	<< For a new plant it can be sourced from FE, Feasibility Studies or technology providers; for an existing plant it is sourced from maintenance contract invoices and energy invoices >>
(Other operating expenditure)	USD/year	<<>>
Insurance	% of Capex p.a.	<<Can be sourced from e.g. insurance quotation/contract>>

Discount rate determination

The discount rate applied is the rate of return that the SSC-CPA implementer expects to obtain from the investment. The selection of the discount rate therefore shall reflect the sector in which the investment is made in and shall be clearly indicated in the CPA DD. It shall be noted that some of the buildings in which the Trigeneration systems may be installed under the PoA may be owned by Public entities. Hence

it is not appropriate to apply a private sector discount rate nor financial parameters to investments that are made by a public sector entity.

Suitable Discount rates to be applied are indicated in the following table

Table B.5.6 Discount factor considerations for NPV cost calculation<<delete SSC CPA implementer type that doesn't apply>>

SSC CPA Implementers	**Discount rate type that may be applied**	**Sources of information upon which to determine the value to be applied**
Private sector entities	WACC	<<As per WACC calculation for ESCO or third party investor modality if WACC is the chosen Discount Rate>>
Government / State owned entity	Government Bond Rate or Govt./official approved discount	<< provide if the SSC CPA implementer is a Public owned entity. >>

Applying the above date to the NPV cost calculations shows that the Net Present Value of the total costs associated with operating the existing system,<< provide NPV cost value of existing system>>, is less than that the of the proposed SSC CPA of << provide the NPV Cost of proposed SSC CPA>>.

<u>Sensitivity analysis</u>

As specified in the excel spreadsheet to be supplied to the DOE upon submission of a CPA DD, a sensitivity analysis has been conducted on variables that constitute more than 20% of either the total project costs or the total project revenues, and shall include the following variables: (1) total investment for the proposed SSC CPA; (2) O&M Costs for both the SSC CPA and the existing system, (3) Energy costs associated with the ongoing operation of the existing system and those which would be incurred in under the proposed SSC CPA.

Table B.5.7 Framework for reporting results of sensitivity analysis

Factor	**Variation**	
	Existing System +10% (or more if appropriate)	Proposed SSC CPA -10% (or less if appropriate)
Total investment	--	<<>>%
O&M Cost	<<>> %	<<>> %
Energy costs	<<>> %	<<>> %

The NPV of the total costs of the proposed SSC CPA remains higher than those of the existing system. Hence, the proposed SSC CPA is not a financially attractive investment for the << SSC CPA Implementer name>>to pursue and the project is thus deemed to be additional.

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

B.6.1. Explanation of methodological choices

>> The emissions reductions achieved by each CPA are calculated according to the approved methodology AMS II.K. Version 02.0, Scope 03, EB 54 "*Installation of cogeneration or trigeneration systems supplying energy to commercial buildings"*. The emission reductions will be measured as differences between the baseline emissions and sum of the project emission and leakage.

Project emissions

a) Emissions from physical leakage of refrigerant, with a GWP than zero shall be considered in cases in which high efficiency chillers are installed either as integral part of a cogeneration system or in case of a new facility where such chillers are used as back up. The Quantity of refrigerant used in year y to replace that which has leaked can be determined by any of the two Options provided in AMS II.k Version 02.0.

b) Fossil fuels are used to run a trigeneration system's power plant and may be used at times to supplement the waste heat that is used to produce hot water or steam. Project emissions due to fossil fuel combustion are calculated as given in the "Tool to calculate project or leakage CO_2 emissions from fossil Fuel Combustion" EB 41 Annex 11. The CO_2 emissions coefficient is calculated based on Option B of the referred tool.

c) Electricity may have to be imported from the grid into the Trigeneration system at certain times, e.g. during start up or even normal operation, to run auxiliary or critical plant equipment that is not fed off the cogeneration power plant, or to compensate for the system's power plant not being able to cover the building's demand due to partial loss of performance, due to planned or unforeseen outages of certain sections of the cogeneration system's power plant, etc. Project emissions associated with the use of electricity that is consumed by components of the cogeneration system under circumstances such as these, but which is not generated by cogeneration system's own power plant shall be determined in accordance with the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption".

   Hence *"Scenario A: Electricity consumption from the grid"* is the applicable scenario.

   The calculation of the Project Emissions resulting from the electricity consumed from the grid by a SSC CPA in year *y* requires that the approach chosen to establish the Emissions Factor of this electricity be defined:

   The option chosen to determine the emissions factor to be applied is *"Option A1":*

   "calculate the combined margin emissions factor of the applicable electricity system, using the procedures in the latest approved version of the "Tool to calculate the emissions factor for an electricity system" .

   It also requires that the Average Technical Transmission and Distribution losses for providing electricity to the sources *j* in the cogeneration system that may consume such electricity be defined as well:

   The Average Technical Transmission and Distribution losses for providing electricity to a source of consumption *j* in year *y*, $TDL_{j,y}$ are assumed to be 3%, in accordance with the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" Annex 7 (Version 01)" whereby for Scenario A, a 3% default value may be applied if the electricity consumption by all project electricity consumption sources to which scenario A applies is smaller than the electricity consumption of all baseline electricity consumption sources to which scenario A applies. This is the case in all cogeneration projects since the electricity needs of the project activity are met by far from cogeneration power plant, and only occasionally, are such power requirements partly met by electricity drawn from the grid.

Leakage:

There are several potential sources of leakage that may be have to be considered for either or both of the Project Scenario Types that can be pursued under the proposed PoA:

Leakage due the installation of energy generation equipment which is transferred from another activity or leakage due to the transfer of the existing energy generation equipment to another activity.

Project Scenario Type 1 SSC CPAs.

Leakage due to the installation of energy generation equipment which is transferred from another activity is considered to be zero in Project Scenario Type 1 SSC CPAs, since only new equipment is used in SSC CPAs that seek to install a cogeneration system in buildings that are yet to be built. Leakage due to the transfer of existing energy generation equipment to another location is not relevant this Project Scenario type since no generation equipment exists at site where the proposed SSC CPA is to be built.

Project Scenario Type 2 SSC CPAs.

Leakage due to the installation of energy generation equipment which is transferred from another activity is considered to be zero in Project Scenario Type 2 SSC CPAs, since only new equipment is used in SSC CPAs that seek to install a cogeneration system in buildings that are yet to be built. Leakage due to the transfer of existing energy generation equipment to another location is considered cero because such equipment shall be scrapped.

The choice of equations to apply to determine the baseline emissions shall be described in the SSC CPA DD taking into account the characteristics of the project and baseline scenarios.

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

Data / Parameter	*RL*
Unit	Years
Description	Remaining lifetime of the baseline or project equipment
Source of data	<<>>
Value(s) applied	<<>>
Choice of data or Measurement methods and procedures	<<>>
Purpose of data	
Additional comment	Only applicable to SSC CPAs that involve the installation of a trigeneration system to an existing building in which the proposed system supplements or replaces existing systems, ie Project Scenario 2 type SSC CPAs. If not applicable, please delete.

Data / Parameter	$TDL_{j,y}$
Unit	--
Description	Average technical transmission and distribution losses for providing electricity to (project consumption) source *j* in year *y*
Source of data	"Tool to calculate baseline, project and/or leakage emissions for electricity consumption" (version 01)"
Value(s) applied	Default value of 3%
Choice of data or Measurement methods and procedures	Project emissions are to be calculated for the electricity that may be occasionally be drawn from the grid (Scenario A of the referred tool) and used by the trigeneration system to run parts of it or serve as backup (project consumption sources *j*) if for whatever reason the electrical demands cannot be met by the trigeneration system's power plant. The 3% default value is applied since the Electricity consumption by all project electricity consumption sources in the trigeneration system is much smaller than the electricity consumed by all the baseline consumption sources. One of the key objectives of the trigeneration system is the production of power, i.e. not to import power from the grid.
Purpose of data	Used to estimate project emissions
Additional comment	-

Data / Parameter	$SFC_{cp,i}$
Unit	Quantity of fuel in thermal, mass or volume unit/MWh)
Description	Specific fuel consumption rate of the captive power plant
Source of data	<<>>
Value(s) applied	<<>>
Choice of data or Measurement methods and procedures	(a) For project activities displacing electricity previously obtained from the operation of existing captive power plants, the specific fuel consumption rate should be established based on historical performance data from the last three years. (b) If historical data is insufficient or unreliable manufacturer's lowest quoted value for the plant shall be applied as a conservative alternative
Purpose of data	Used to estimate baseline emissions
Additional comment	Only applicable for Project Scenario Type 2 SSC CPAs in which the electricity would have been generated using captive power plants. If not applicable, please delete.

<table>
<tr><td>Data / Parameter</td><td>$COEF_{i,j}$</td></tr>
<tr><td>Unit</td><td>tCO_2/mass or volume unit</td></tr>
<tr><td>Description</td><td>CO_2 emission coefficient of 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><th>Data Source</th><th>Conditions for using the data source</th></tr>
<tr><td>a) Values provided by the fuel suppliers in invoices</td><td>This is the preferred source if the carbon fraction of the fuel is not provided (Option A)</td></tr>
<tr><td>b) Measurements by the project participants</td><td>If a) is not available</td></tr>
<tr><td>c) Regional or national default values</td><td>If a) is not available</td></tr>
<tr><td>d) IPCC default values at the upper 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>If (a) is not available</td></tr>
</table></td></tr>
<tr><td>Value(s) applied</td><td><<>></td></tr>
<tr><td>Choice of data or Measurement methods and procedures</td><td><< >>
For a) and b): Measurements should be undertaken in line with national or international fuel standards

For a) and b): If the fuel supplier does provide the NCV value and the CO_2 emissions factor on the invoice and these two values are based on measurements for this specific fuel, the CO_2 factor should be used. If another source for the e CO_2 missions factor is used or no CO_2 emissions factor is provided, options b), c) or d) should be used</td></tr>
<tr><td>Purpose of data</td><td>Used to estimate project emissions</td></tr>
<tr><td>Additional comment</td><td></td></tr>
</table>

Data / Parameter	$E_{capt,hist,i}$
Unit	MWh
Description	Electricity consumed from the captive power plant, i (historical, i.e. three most recent years)
Source of data	Metered electricity consumption figures and invoices
Value(s) applied	To be described in the corresponding SSC CPA DD
Choice of data or Measurement methods and procedures	The metered values of electricity supplied from captive power plants shall be crosscheked against invoices for the same period in cases where the such invoices exist (i.e. third party supplies the power). In cases where the captive power is run by the owner of the site where the CPA is to be implemented, the metered quantities of electricity generated shall be cross checked against fuel bills for the same period and multiplying the total fuel consumed by the specific fuel consumption of the captive power plant, i.e. $SFC_{cp,i}$. If the emissions factor of the captive power plant is higher than that of the grid, the lower between the metered and crosschecking sources of electricity consumption figures shall be taken. Conversely, if the emissions factor for the captive power plant is lower than that of the grid, the higher between the two electricity consumption values shall be used to ensure conservativeness in the determination of the weighted average emission factor (EF electricity) in accordance with AMS II.K/Version 02.0.
Purpose of data	Used to estimate baseline emissions
Additional comment	Applicable in cases where the electricity that is displaced would have been provided by a combination of captive power plants and the grid.

Data / Parameter	$E_{grid,hist}$
Unit	MWh
Description	Electricity consumed from the grid (historical, i.e. for each of three most recent years)
Source of data	Metered electricity consumption figures and invoices
Value(s) applied	To be described in the corresponding SSC CPA DD
Choice of data or Measurement methods and procedures	The metered values of electricity consumed shall be cross checked against electricity invoices for the same period. If the emissions factor of the captive power plant that also supplies electricity is higher than that of the grid, the largest between the two values of electricity consumption figures shall be taken to be the electricity consumed from the grid. Conversely, if the emissions factor of the captive power plant is less than that of the grid the lower between the two values of energy consumed from the grid values shall be taken to ensure conservativeness in the determination of the weighted average emission factor (EF electricity) in accordance with AMS II.K/Version 02.0
Purpose of data	Used to estimate baseline emissions
Additional comment	Applicable in cases where the electricity that is displaced would have been provided by a combination of captive power plants and the grid.

Data / Parameter	$COP_{c,i}$
Unit	--
Description	The Coefficient of Performance of the baseline scenario chiller(s) *i* (MWh_{th}/MWh_e). The Coefficient of Performance is defined as 'cooling output divided by electricity input'
Source of data	For Project Scenario Type 1 SSC CPAs source shall be the COP specified for the baseline reference plant, and taken as the highest COP full load performance value provided by two or more manufacturers for chillers commonly sold in the project country For Project Scenario Type 2 source shall be either the baseline cooling plant or if the baseline is determined to be the baseline reference plant COP shall be:<< input value given in PoA >>
Value(s) applied	<<>>
Choice of data or Measurement methods and procedures	[Choose as applicable and delete the other text:] For Project Scenario Type 1 SSC CPAs. AMS II k requirement. For Project Scenario Type 2 SSC CPAs where the baseline scenario is the operation of an existing chiller or chillers, then the COP shall be based on existing chiller performance data from last three years, immediately preceding the start of the project activity. In the case where multiple chillers exist, average performance data shall be used in a conservative manner with consideration of the historic output and power consumption of each chiller.
Purpose of data	Used to estimate baseline emissions
Additional comment	As indicated in the PoA DD

Data / Parameter	C_{pw}
Unit	MJ/tonnes °C
Description	Specific heat capacity of water
Source of data	AMS II.K/ Version 02.0
Value(s) applied	4.2 MJ/t °C
Choice of data or Measurement methods and procedures	As per AMS II.K/Version 02.0
Purpose of data	Used to estimate baseline emissions
Additional comment	

Data / Parameter	η_{cs}
Unit	
Description	Efficiency of the displaced steam generation system(s) in year *y*
Source of data	<<>>
Value(s) applied	<<>>
Choice of data or Measurement methods and procedures	Project Scenario Type 1 SSC CPAs: As per para 22 (a) (i) of AMS II.K. Version 02.0, If the baseline scenario is a steam generator or generators that would have been built (i.e., not existing steam generators), the efficiency shall be determined per the "Tool to determine the baseline efficiency of thermal or electric energy generation systems"; Project Scenario Type 2 SSC CPAs: As per para 22 (b) (ii) of AMS II.K Version 02.0, If the baseline scenario is an existing fossil fired steam generator or generators, then the efficiency shall be based on existing steam generator performance data from last three years, immediately preceding the start of the project activity. In the case where multiple steam generators exist, average performance data shall be used in a conservative manner with consideration of the historic output and power consumption of each steam generator.
Purpose of data	Used to estimate baseline emissions
Additional comment	Where performance data of existing boilers is not available or unreliable, design efficiency values for the existing boiler models may be taken as a conservative alternative.

Data / Parameter	$GWP_{ref,PJ}$
Unit	tCO_{2e}/t refrigerant
Description	Global Warming Potential of the refrigerant used in new cooling equipment
Source of data	If the refrigerant used is listed in Annex A of the Protocol, then values listed in IPCC's second assessment report shall be used, else values listed in the IPCC's third assessment report shall be used.
Value(s) applied	To be given in the SSC CPA DD
Choice of data or Measurement methods and procedures	
Purpose of data	Used to estimate project emissions
Additional comment	

Data / Parameter	GWP_{ref}
Unit	tCO_2e/t refrigerant
Description	Global Warming Potential of the refrigerant used in the baseline chillers
Source of data	If the refrigerant used is listed in Annex A of the Protocol, then values listed in IPCC’s second assessment report shall be used, else values listed in the IPCC’s third assessment report shall be used.
Value(s) applied	<<>>
Choice of data or Measurement methods and procedures	<<>>
Purpose of data	Used to estimate leakage
Additional comment	The GWP_{ref} may differ from $GWP_{ref,PJ}$ which refers to the non ODP refrigerant that might be used in new cooling equipment

<table>
<tr><td>Data / Parameter</td><td>$NCV_{i,y}$</td></tr>
<tr><td>Unit</td><td>GJ per mass or volume unit (e.g. GJ/m^3, GJ/ton)</td></tr>
<tr><td>Description</td><td>Weighted average net calorific value of fuel type 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><th>Data Source</th><th>Conditions for using the data source</th></tr>
<tr><td>a) Values provided by the fuel suppliers in invoices</td><td>This is the preferred source if the carbon fraction of the fuel is not provided (Option A)</td></tr>
<tr><td>b) Measurements by the project participants</td><td>If a) is not available</td></tr>
<tr><td>c) Regional or national default values</td><td>If a) is not available</td></tr>
<tr><td>d) IPCC default values at the upper 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>If (a) is not available</td></tr>
</table></td></tr>
<tr><td>Value(s) applied</td><td><<>></td></tr>
<tr><td>Choice of data or Measurement methods and procedures</td><td>For a) and b): Measurements should be undertaken in line with national or international fuel standards

For a) and b): The NCV should be obtained for each fuel delivery, from which weighted average annual values should be calculated
For c): Review appropriateness of the values annually
For d): Any future revision of the IPCC Guidelines should be taken into account</td></tr>
<tr><td>Purpose of data</td><td>Used to estimate baseline and project emissions</td></tr>
<tr><td>Additional comment</td><td></td></tr>
</table>

Data / Parameter	$EF_{CO2,i,y}$
Unit	t CO_2/GJ
Description	Weighted average CO_2 emissions factor for fuel type in year *y*
Source of data	**Data Source** / **Conditions for using the data source**: a) Values provided by the fuel suppliers in invoices — This is the preferred source b) Measurements by the project participants — If a) is not available c) Regional or national default values — If a) is not available These sources can only be used on well documented, reliable sources (such as national energy balances) d) IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol, 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories — If (a) is not available
Value(s) applied	<<>>
Choice of data or Measurement methods and procedures	For a) and b): The NCV should be obtained for each fuel delivery, from which weighted average annual values should be calculated For c): Review appropriateness of the values annually For d): Any future revision of the IPCC Guidelines should be taken into account
Purpose of data	Used to estimate baseline and project emissions
Additional comment	For a) and b): Measurements should be undertaken in line with national or international fuel standards

Data / Parameter	$EF_{grid,y}$
Unit	t CO_2e/MWh
Description	CO_2 emission factor for the grid electricity displaced in year y in the relevant host country
Source of data	<<For the Kingdom of Saudi Arabia DNA at http://www.cdmdna.gov.sa/news/11-12-11/Baseline_Determination_for_the_Electricity_Grid_in_Saudi_Arabia.aspx as given in the current version of the PoA DD>>
Value(s) applied	<< calculated as per provisions of AM S-I.D and describe calculation in Annex 4 of the SSC CPA DD and present value calculated here>>
Choice of data or Measurement methods and procedures	<< >>
Purpose of data	Used to estimate baseline and project emissions
Additional comment	Value is to be applied ex-ante and to remain fixed during the first crediting period of the SSC CPA.

Data / Parameter	$Q_{ref,start,i}$
Unit	t refrigerant
Description	Quantity of refrigerant (charge) contained in chiller i assumed to be present at the start of the SSC CPA crediting period, t Refrigerant
Source of data	Baseline chiller information
Value(s) applied	To be described in the SSC CPA DD
Choice of data or Measurement methods and procedures	<< >>
Purpose of data	Used to estimate project emissions
Additional comment	To be applied only to Project Scenario Type 2 SSC CPAs. To be applied only once to determine Leakage Emissions associated with the displacement of GWP refrigerant containing baseline chillers, which are *assumed*, for conservative reasons to not having been destroyed and thus escape to atmosphere during the 1st year of the crediting period. It differs from $Q_{ref,PJ,start}$ which refers to the refrigerant charge in new equipment at the start of their operation.

Data / Parameter	GWP_{CH4}
Unit	tCO_2e/tCH_4
Description	Global warming potential of methane valid for the relevant commitment period
Source of data	IPCC
Value(s) applied	Default value for the first commitment period = 21 tCO_2e/tCH_4
Choice of data or Measurement methods and procedures	<< >>
Purpose of data	Used to estimate leakage
Additional comment	-

B.6.3. Ex-ante calculations of emission reductions
>> The SSC-CPA is a Trigeneration system that involves:

- Supplying Electricity from <<technology used to supply power in proposed SSC CPA>>
- Supplying Cooling (chilled water) <<technology used to supply chilled water in proposed SSC CPA>>
- Supplying <<Hot water/Steam (delete as appropriate)>>

The equations, data and parameters that are applicable to the proposed SSC-CPA for the purpose of determining the baseline, project and leakage emissions are as follows:

A. Calculation of baseline emissions

The baseline emissions, BE_y, are calculated using equation (1):

$$BE_y = BE_{grid,y} + BE_{capt,y} + BE_{BC,y} + BE_{BH,y} \qquad \textbf{(1)}$$

Where:

$BE_{grid,y}$	Baseline emissions associated with the grid electricity displaced by the project in year *y* (t CO_2e/year)
$BE_{capt,y}$	Baseline emissions associated with the electricity produced by a captive power plant in year *y* (tCO_2e/year)
$BE_{BC,y}$	Baseline emissions associated with the cooling (e.g., chilled water) produced in year *y* (tCO_2e/year)
$BE_{BH,y}$	Baseline emissions associated with the heat (e.g., steam or hot water) produced in year *y* (tCO_2e/year)

<< select which of the following calculations to determine the baseline emissions associated to the electricity that is produced by the proposed SSC-CPA is applicable. Delete the remaining equations and corresponding text>>

A.1 Baseline emissions associated with the grid electricity displaced by the project in year *y*

The emissions associated with the electricity that the SSC CPA displaces which would have been sourced from the grid to meet electrical load other than those imposed by the chilled water system are::

(a) If the SSC CPA displaces electricity that was previously obtained from the grid or would have been obtained from the grid, the baseline emissions include the CO_2 emissions of the power plants connected to the grid. The baseline emissions ($BE_{grid,y}$) $BE_{P,y}$)are calculated based on the amount of grid electricity displaced by the SSC CPA times are calculated based on the amount of grid electricity displaced by the SSC CPA times the emission factor of the grid calculated, as indicated in equation (2) in accordance with methodology AMS-I.D.

$$BE_{grid,y} = E_{grid,y} * EF_{grid,y} \quad \textbf{(2)}$$

$BE_{grid,y}$	Baseline emissions for the grid electricity displaced by the project in year *y* (tCO_2e/year)
$E_{grid,y}$	Amount of grid electricity displaced by project in year *y* (MWh)
$EF_{grid,y}$	Emission factor of the grid (calculated in accordance with methodology AMS-I.D (tCO_2e/MWh)

= <<>>MWh/yr *<<>> tCO_2/MWh

= <<>> tCO_2 /yr

A.2 Baseline emissions associated with the electricity produced by a captive power plant in year *y*

If the SSC CPA displaces electricity that was previously obtained from captive power plant(s), the baseline emissions $(BE_{capt,y})$ include the CO_2 emissions calculated based on the amount of captive power plant electricity displaced by the project activity times the emission factor of the captive power plant(s) calculated, as indicated in equation (3). As above, the electricity that is displaced is electricity that would have been used to meet electrical loads other than those resulting from the operation of the baseline chillers.

$$BE_{capt,y} = \sum_i E_{capt,i,y} * EF_{capt,i} \quad \textbf{(3)}$$

Where:

$BE_{capt,y}$	Baseline emissions for the amount of electricity displaced by the captive power plants in year *y* (tCO_2e/year)
$E_{capt,y,i}$	Amount of electricity displaced by project in year *y* (MWh_e) from captive power plant *i*
$EF_{capt,i}$	Emission factor of the captive power plant *i* (tCO_2/MWh_e)

The emission factor of each captive power plant is calculated based on the specific fuel consumption rate[13] (quantity of fuel in thermal, mass or volume unit per unit electrical output) of the captive power plant ($SFC_{cp,i}$ SFC_x) determined as follows:

(a) For project activities displacing electricity previously obtained from the operation of existing captive power plants, the specific fuel consumption rate should be established based on historical performance data from the last three years;

(b) For project activities displacing electricity from a captive power plant that otherwise would have been built, the specific fuel consumption rate is obtained from at least two manufacturers of systems of similar specifications and a conservative value shall be used;

(c) The emission factor of each captive power plant is calculated as the product of the emission factor of fuel *j* used by captive power plant *i* ($COEF_{i,j}$ $COEF_i$) times $SFC_{cp,i}$;SFC_x Equations 2, 3, or 4 contained in the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" shall be used for this purpose. See equation below.

$$EF_{capt,i} = \sum_j COEF_{i,j} * SFC_{cp,i} \qquad \textbf{(4)}$$

Where:

$EF_{capt,i}$	Emission factor of captive power plant *i* (tCO_2/MWh_e)
$SFC_{cp,i}$	Specific fuel consumption rate of the captive power plant (quantity of fuel in thermal, mass or volume unit/MWh)
$COEF_{i,j}$	CO_2 emission coefficient of fuel type *i* (tCO_2 / quantity of fuel in thermal, mass or volume unit)

= ∑ (<<>>MWh/yr * <<>> tCO_2/MWh),*i*,*y*

= <<>> tCO_2 /yr

A.3 Baseline emissions associated with the grid and captive power plant sourced electricity displaced by the project in year *y*.

In case the project activity displaces electricity from a captive power plant as well as from the grid, then the weighted average emission factor for the displaced electricity is calculated using values based on the relative historical, prior three year ratios of electricity from captive plants and the grid.[14] For new facilities, the most conservative (lowest) emission factor of the two power sources should be used.

The ratios of the quantities of electricity that are obtained from captive power plants and the grid shall be determined by adding the total amount of electricity obtained from each source of electricity on its own over the more recent three years (i.e. $E_{capt,hist,i}$, in the case of electricity obtained from captive power

[13] In case in the baseline situation where more than one type of fossil fuel is used in the captive power plant, the relative contribution to the total output of each fossil fuel shall be considered and the formulas for baseline emissions shall be adjusted accordingly.

[14] For example if in the baseline 80% of annual electricity requirement was met by grid import and the remaining by captive generation, the weighted average emission factor ($EF_{electricity}$) would be 0.8 EF_{grid}+ 0.2 $EF_{captive}$.

plants and $E_{grid,hist}$ in the case of electricity drawn from the grid) and dividing each the resulting two consumption figures by the total (combined) amount of electricity consumed over those same 3 years, i.e. the sum of the electricity drawn from the grid plus that drawn from the captive power plants over that same period.

A.4. Baseline emissions associated with the cooling (e.g., chilled water) produced in year *y*

The emissions associated with the electricity that would have been used in the absence of a SSC CPA by electrically driven chillers, whether the electricity used to run them is sourced from the grid and/or captive power plants, to produce chilled water within the project boundary are determined per equation below.

$$BE_{BC,y} = EF_{ELEC,y} \times \sum_i \frac{C_{P,i,y}}{COP_{c,i}} \quad \textbf{(5)}$$

Where:

$BE_{BC,y}$	Baseline emissions for chilled water produced in the project activity in year *y* (tCO_2e/year)
$EF_{ELEC,y}$	Electricity emission factor of the grid, calculated in accordance with methodology AMS-I.D, and/or of the captive plant(s), calculated in accordance with equation 4. (tCO_2e/MWh)
$COP_{c,i}$	The Coefficient of Performance of the baseline scenario chiller(s) *i* (MWh_{th}/MWh_e). The Coefficient of Performance is defined as 'cooling output divided by electricity input'
$C_{p,i,y}$	Cooling output of baseline scenario chiller(s) *i* in year *y*(MWh_{th}/year)

a) Determination of Baseline Scenario Chiller Coeficient of performance

The Baseline scenario chiller Coefficient of Performance is determined as follow, as per AMS II.K Version 02.0:

<<delete which of the following approaches to determine baseline chiller that does not apply >>

For Project Scenario Type 1 SSC CPAs:

If the baseline scenario is determined to be a chiller or chillers that would have been built (i.e., there are no existing chillers in place), the Coefficient of Performance shall be determined as the highest COP full load performance value provided by two or more manufacturers for chillers commonly sold in the project country for the indicated commercial application.

For Project Scenario Type 2 SSC CPAs:

If the baseline scenario is an existing chiller or chillers, then the COP shall be based on existing chiller performance data from last three years, immediately preceding the start of the project activity. In the case where multiple chillers exist, average performance data shall be used in a conservative manner with consideration of the historic output and power consumption of each chiller;

In cases where the baseline emissions are to be determined by assuming that a baseline reference plant would have been built, then the baseline COP shall be determined as the highest COP full load performance value provided by two or more manufacturers for chillers commonly sold in the project country for the indicated commercial application. i.e. the COP of the technology that is assumed would have been used in the Baseline Reference plant to meet a buildings space cooling requirements

b) Determination of Cooling Output of each baseline scenario chiller

The cooling output of each baseline scenario chiller *i* is calculated using measured values of the total chilled water mass flow-rate and of the differential temperature of incoming and outgoing chilled water; as recorded on an hourly basis in year *y* per equation below.

$$C_{p,i,y} = \frac{\sum_{h=1}^{8,760} m_{C,i,h} * C_{\rho w,C} * \Delta T_{C,i,h}}{3600} \tag{6}$$

Where:

$C_{p,i,y}$	Cooling output of the baseline chiller(s) *i* in year *y* (MWh_{th}/year)
$m_{C,i,h}$	The chilled water mass flow-rate for chiller(s) *i* produced by project in hour *h* of year *y* (tonnes/hour)
$C_{\rho w,C}$	The specific heat capacity of water (MJ/tonnes °C) (4.2 MJ/t °C)
$\Delta T_{C,i,h}$	Differential temperature of inlet and outlet chilled water for chiller(s) *i* in hour *h* of year *y* of incoming and outgoing water from project (°C)

= (<<>> tonne/hr x 8760 hr/yr x 4.2 MJ/t °C x <<>>°C)/3600

= <<>>MWh/yr

Therefore, $BE_{BC,y} = EF_{ELEC,y} \times \sum_i \frac{C_{P,i,y}}{COP_{c,i}}$

= <<>> tCO_2e/MWh x∑(<<>>MWh/yr/<<>>)*i*

= <<>>tCO_2 /yr

A.5 Baseline emissions associated with the heat (e.g., steam or hot water) produced in year *y*

A.5.1 Baseline emissions associated with steam production

$$BE_{BH,y} = \sum_i EF_i \times \frac{S_{p,i,y}}{\eta_{cs}} \tag{8}$$

Where:

$BE_{BH,y}$	Baseline emissions for steam produced in the project activity in year *y*

EF_i	Emission factor of fossil fuel *i*,
η_{cs}	Efficiency of the displaced steam generation system(s) in year *y*
$S_{p,y}$	Thermal energy delivered by the project activity (TJ) in year *y* measured on an hourly basis using mass flow rate and enthalpy data

(a) Select the applicable approach to determining the efficiency of the fossil fuel fired steam generation systems (η_{cs}). << delete the one that is not applicable>>:

Project Scenario Type 1 SSC CPAs

As per para 22 (a) (i) of AMS II.K. Version 02.0, If the baseline scenario is a steam generator or generators that would have been built (i.e., not existing steam generators), the efficiency shall be determined per the "Tool to determine the baseline efficiency of thermal or electric energy generation systems";

Project Scenario Type 2 SSC CPAs

As per para 22 (b) (ii) of AMS II.K Version 02.0, If the baseline scenario is an existing fossil fired steam generator or generators, then the efficiency shall be based on existing steam generator or performance data from last three years, immediately preceding the start of the project activity. In the case where multiple steam generators, average performance data shall be used in a conservative manner with consideration of the historic output and power consumption of each steam generator

The baseline emissions associated with the combustion of fossil fuels shall be determined as indicated in the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".

A.5.2 Baseline emissions associated with hot water production

The baseline emissions associated with the production of hot water are determined using the electricity emission factor and hourly measurements of the total water mass flow-rate and differential temperature of incoming and outgoing water, per equation below.

This equation is based on the assumption that the hot water produced in the absence of the SSC-CPA would have been produced in electric water heating systems operating at100% efficiency.

$$BE_{BH,y} = EF_{ELEC,y} \times \sum_{h=1}^{8,760} \frac{m_h * C_{\rho w} * \Delta T_h}{3600} \qquad \textbf{(7)}$$

Where:

$BE_{BH,y}$	Baseline emissions for hot water produced in the project activity in year *y*
$EF_{ELEC,y}$	Electricity emission factor of the grid (calculated in accordance with methodology AMS-I.D and/or captive plant(s) (calculated in accordance with equation above) (tCO_2e/MWh)
m_h	The water mass flow-rate from heater(s) during hour *h* in year *y* (tonnes/hr)
$C_{\rho w}$	The specific heat capacity of water (MJ/tonnes °C) (4.2 MJ/t °C)

ΔT_h	Differential temperature of inlet and outlet hot water for heater(s) during hour *h* (°C)

= <<>> tCO_2e/MWh x (<<>> tonne/hr x 8760 hr/yr x 4.2 MJ/t °C x <<>>°C)/3600

= <<>> tCO_2/yr

Total Baseline Emissions

The total Baseline emissions:

$$BE_y = BE_{grid,y} + BE_{capt,y} + BE_{BC,y} + BE_{BH,y} \quad \textbf{(1)}$$

= <<>> tCO_2 /yr + <<>> tCO_2 /yr+<<>> tCO_2 /yr+ <<>> tCO_2 /yrtCO_2/yr

= <<>>tCO_2 /yr

B. Project activity emissions

1. Project emissions are equal to a) the emissions associated with consumption of fossil fuel and electricity within the project boundary by the co-generation or tri-generation system, auxiliary equipment, and systems (such as boilers, chiller and hot water heaters, captive electricity generation plants) used to generate any backup or supplemental electricity, heating or cooling and (b) the emissions associated with any refrigerants used in new project cooling equipment (e.g. electrical compression chillers which are an integral part of a co-generation/tri-generation system or in the case of a new facility where electrical compression chillers are used as a backup).

Project emissions for both Project Scenario Types are determined as follows:

$$\mathrm{PE_y} = PE_{ref,y} + PE_{energy,y} \quad \textbf{(9)}$$

Where:

$PE_{ref,y}$	Project emissions from physical leakage of refrigerant, with a GWP greater than zero, from new cooling equipment in year *y*, determined in accordance with paragraph 25 below (tCO_2e/yr)
$PE_{energy,y}$	Project emissions due to consumption of fossil fuel and/or electricity (tCO_2/yr). Equal to:

- Fuel consumption of project including any fuel used to run auxiliary equipment. Emissions are calculate using the “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion”;
- Electricity consumption of project including any electricity used to run auxiliary equipment is calculated using the “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”

B.1 Project emissions from physical leakage of refrigerant

Emissions from physical leakage of refrigerant from new cooling equipment are determined as follows:[15]
For first project year of the first crediting period:

$$PE_{ref,1} = \left(Q_{ref,PJ,start}\right) * GWP_{ref,PJ} \quad (10)$$

For projects years beyond the first year:

$$PE_{ref,y} = \left(Q_{ref,PJ,y}\right) * GWP_{ref,PJ} \quad (11)$$

Where:

$PE_{ref,y}$	Project emissions from physical leakage of refrigerant from new cooling equipment in year *y* (tCO_2e/yr)
$Q_{ref,PJ,start}$	Quantity of refrigerant charge in new cooling equipment at its start of operation (only accounted for in the first year of the first crediting period) (tonnes)
$Q_{ref,PJ,y}$	Quantity of refrigerant used in year *y* to replace refrigerant that has leaked in year *y* (tonnes/year)
$GWP_{ref,PJ}$	Global warming potential of the refrigerant that is used in new cooling equipment (tCO_2e/t refrigerant)

$Q_{ref,PJ,y}$ is determined using one of the following options: << chose the option that is applicable and delter the other one>>

Option A: using the higher of the two quantities below:

(a) The monitored quantity of refrigerant used for top up to compensate for the leaked quantity during the year *y*; or

(b) The typical refrigerant leakage rate for the type of cooling equipment as determined from the Emission Factors (expressed in terms percentage of the initial charge/year) provided in the IPCC 2006 Guidelines, Chapter 7, Table 7.9 “Estimates for charge, lifetime and emissions factors for refrigeration and air conditioning systems”.

Option B: use a default value of 35% of the initial refrigerant charge, i.e. $Q_{ref,PJ,y} = 0.35 * Q_{ref,PJ,start}$

B.2 Project emissions due to consumption of fossil fuel and/or electricity

Project emissions due to consumption of fossil fuel and/or electricity (tCO_2/yr) are determined as follows.

$$PE_{energy,y} = PE_{FC,j,y} + PE_{EC,y} \quad \textbf{(12)}$$

15 Baseline emissions related to refrigerant use are assumed to equal zero.

$PE_{FC,j,y}$	=	Project emissions from fossil fuel consumption in year *y* , tCO_2/yr
$PE_{EC,y}$	=	Project emissions from electricity consumption in year *y* , tCO_2/yr

B.2.1 Project CO_2 emissions from fossil fuel combustion

Fuel consumption of project including any fuel used to run auxiliary equipment. Emissions are calculated using the: "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"; as follows:

CO_2 emissions from fossil fuel combustion in process j are calculated based on the quantity of fuels combusted and the CO_2 emission coefficient of those fuels, based on Option B) as follows:

$$PE_{FC,j,y} = \sum FC_{i,j,y} \times COEF_{i,y} \quad \textbf{(13)}$$

Where: $PE_{FC,j,y}$	=	Are the CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2/yr);
$FC_{i,j,y}$	=	Is the quantity of fuel type icombusted in the trigeneration (delete as appropriate)>> system j during the year y (mass or volume unit/yr);
$COEF_{i,y}$	=	Is the CO_2 emission coefficient of fuel typeiin year y (tCO_2/mass or volume unit)
i	=	Are the fuel types combusted in process j during the year y

The CO_2 emission coefficient $COEF_{i,y}$ is calculated based on net calorific value and CO_2emission factor of the fuel type i, as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y} \quad \textbf{(14)}$$

Where:

$COEF_{i,y}$	=	Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
$NCV_{i,y}$	=	Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$	=	Is the weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ)
i	=	Are the fuel types combusted in process j during the year y

= <<>> GJ/tonne *<<>>tCO_2/GJ

= <<>>tCO_2 /tonne

Therefore,

$PE_{FC,j,y} = \sum FC_{i,j,y} \times COEF_{i,y}$

$= \sum(\text{<<>> tonnes/yr} * \text{<<>>}tCO_2\text{/tonne})_{i,y}$

$= \text{<<>>}tCO_2\text{/yr}$

B.2.2 Project emissions associated with the consumption of electricity drawn from the grid

CO_2 emissions associated with any electricity drawn from the grid which might have to be used during startup or during partial / full outage of the trigeneration facility's power plant calculated using the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption", as follows:

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y}) \quad \textbf{(15)}$$

Where:

$PE_{EC,y}$	=	Project emissions from electricity consumption the year y (tCO_2/yr);
$EC_{PJ,j,y}$	=	Quantity of electricity consumed by the project electricity consumption source *j* in year y (MWh/yr);
$EF_{EL,j,y}$	=	Emissions factor for electricity generation for source j in year *y* (tCO_2/MWh)
$TDL_{j,y}$	=	Average technical transmission and distribution losses for providing electricity to consumption source j in year y (tCO_2/mass or volume unit)
j	=	Sources of electricity consumption in the project

The Emission Factor corresponding to the electricity consumed shall be combined margin emission factor of the applicable electricity system, using the procedures in the latest approved version of the "Tool to calculate the emission factor for an electricity system" ($EF_{EL,j,y} = EF_{grid,CM,y}$)

$= \text{<<>>0 MWh/y} * \text{<<>> } tCO_2\text{/MWh} * (1+ 0.03)$

$= \text{<<>>}tCO_2\text{/yr}$

C. Leakage

Potential Sources of leakage that are applicable to the proposed SSC CPA include << select as appropriate and delete the rest>>

C.1 Leakage due to the installation of energy generation equipment which is transferred from another activity or leakage due to the transfer of the existing energy generation equipment to another activity.

Project Scenario Type 1 SSC CPAs.

Source of leakage can be taken as zero since only new equipment is used in SSC CPAs that seek to install a trigeneration system in buildings that are yet to be built.

Project Scenario Type 2 SSC CPAs.

Source of leakage due to installation of energy generation equipment is considered zero since only new equipment is installed in the trigeneration system.

Leakage due to the transfer of the existing energy generation equipment to another equipment shall be considered cero since any equipment that is removed from the baseline site shall be destroyed.

Any existing energy generation equipment, such as power plant, chiller and hot water heaters and boilers that are to be removed from the baseline site as a result of the SSC CPA shall be destroyed after replacement to ensure that it is not sold and reutilized but taken out of service permanently. The destruction must be witnessed, photographed (still and video), and certified by an independent third party and ensuring that provisions are in place that enable the unique identification of the existing equipment that is to be destroyed.

C.2 Leakage due to the displaced refrigerant not being destroyed

Project Scenario Type 1 SSC CPAs

Not applicable to SSC CPAs that install trigeneration systems in buildings that are yet to be built. No refrigerant is displaced as a result of the SSC CPA.

Project Scenario. Type 2 SSC CPAs:

If the displaced refrigerant is a greenhouse gas as defined in Annex A of the Kyoto Protocol or in paragraph 1 of the Convention and is not destroyed, leakage emission from its storage or usage in another equipment must be considered[16] and deducted from the emission reductions.

It shall be assumed for determining the emissions reductions that any refrigerant present in the existing chillers that are displaced by the proposed SSC CPA which has a GWP is not destroyed. The associated project emissions shall be determined based on the equipment manufacturers quoted refrigerant charge, refrigerant type and refrigerant GWP. It is assumed that all this gas is released during the first year of the crediting period. Thereafter this term shall be set to zero

$$LE_{ref,start} = \sum Q_{ref,start,i} x GWP_{ref} \quad \textbf{(16)}$$

$LE_{ref,start}$	=	GHG emissions due to the refrigerant charge contained in the baseline chillers that is *assumed* to be released to the atmosphere as a result of the equipment being displaced by SSC CPA during the 1st year of the crediting period.(tCO_2);
$Q_{ref,start,i}$	=	Quantity of refrigerant (charge) contained in chiller i assumed to be present at the start of the SSC CPA crediting period, t Refrigerant
GWP_{ref}	=	Global Warming Potential of the refrigerant (tCO_{2e}/t refrigerant)
i	=	Baseline chiller number

[16] The global warming potentials used to calculate the carbon dioxide equivalence of anthropogenic emissions by sources of greenhouse gases not listed in Annex A of the Kyoto Protocol, shall be those accepted by the Intergovernmental Panel on Climate Change in its third assessment report.

C.3 Leakage resulting from fuel extraction, processing, liquefaction, transportation, re-gasification and distribution of fossil fuels outside of the project boundary

Leakage emissions resulting from fuel extraction, processing, liquefaction, transportation, re-gasification and distribution of fossil fuels outside of the project boundary shall be considered, as per the guidance provided in the leakage section of ACM0009. In case leakage emissions in the baseline situation are higher than leakage emissions in the project situation, leakage emissions will be set to zero.

For the purpose of determining fugitive methane emissions associated with the production – and in case of natural gas, the transportation and distribution of the fuels – project participants should multiply the quantity of natural gas consumed in all consumption sources *i* (ie equivalent to all "element processes *i* " in ACM0009/Version 03.2) with a methane emission factor for these upstream emissions ($EF_{NG,upstream,CH4}$), and subtract for all fuel types *k* which would be used in the absence of the project activity the fuel quantities multiplied with respective methane emission factors ($EF_{k,upstream,CH4}$), as follows:

$$LE_{CH4,y} = \left[FF_{project,y} \cdot NCV_{NG,y} \cdot EF_{NG,upstream,CH4} - \sum_{k} FF_{baseline,k,y} \cdot NCV_{k} \cdot EF_{k,upstream,CH4} \right] \cdot GWP_{CH4} \quad \textbf{(17)}$$

with

$$FF_{project,y} = \sum_{i} FF_{project,i,y} \quad \textbf{(18)}$$

and

$$FF_{baseline,k,y} = \sum_{i} FF_{baseline,i,k,y} \quad \textbf{(19)}$$

Where:

$LE_{CH4,y}$	=	Leakage emissions due to upstream fugitive CH_4 emissions in the year *y* in t CO_2e
$FF_{project,y}$	=	Quantity of natural gas combusted in all element processes during the year *y* in m³
$FF_{project,i,y}$	=	Quantity of natural gas combusted in the element process *i* during the year *y* in m³
$NCV_{NG,y}$	=	Average net calorific value of the natural gas combusted during the year *y* in GJ/m³
$EF_{NG,upstream,CH4}$	=	Emission factor for upstream fugitive methane emissions from production, transportation and distribution of natural gas in t CH_4 per GJ fuel supplied to final consumers
$FF_{baseline,k,y}$	=	Quantity of fuel type *k* (a coal or petroleum fuel type) that would be combusted in the absence of the project activity in all element processes during the year *y* in a volume or mass unit
$FF_{baseline,i,k,y}$	=	Quantity of fuel type *k* (a coal or petroleum fuel type) that would be combusted in the absence of the project activity in the element process *i* during the year *y* in a volume or mass unit
NCV_k	=	Average net calorific value of the fuel type *k* (a coal or petroleum fuel type) that would be combusted in the absence of the project activity during the year *y* in GJ per volume or mass unit
$EF_{k,upstream,CH4}$	=	Emission factor for upstream fugitive methane emissions from production of the fuel type *k* (a coal or petroleum fuel type) in t CH_4per GJ fuel produced
GWP_{CH4}	=	Global warming potential of methane valid for the relevant commitment period

Where reliable and accurate national data on fugitive CH_4 emissions associated with the production, and in case of natural gas, the transportation and distribution of the fuels is available, project participants should use this data to determine average emission factors by dividing the total quantity of CH_4 emissions by the quantity of fuel produced or supplied respectively.[17] Where such data is not available, project participants may use the default values provided in Table below. In this case, the natural gas emission factor for the location of the project should be used, except in cases where it can be shown that the relevant system element (gas production and/or processing/transmission/distribution) is predominantly of recent vintage and built and operated to international standards, in which case the US/Canada values may be used.

Note that the emission factor for fugitive upstream emissions for natural gas ($EF_{NG,upstream,CH4}$) should include fugitive emissions from production, processing, transport and distribution of natural gas, as indicated in the Table below. Note further that in case of coal the emission factor is provided based on a mass unit and needs to be converted in an energy unit, taking into account the net calorific value of the coal.

Table C.3.1: Default emission factors for fugitive CH_4 upstream emissions[18]

Activity	Unit	Default emission factor	Reference for the underlying emission factor range in Volume 3 of the *1996 Revised IPCC Guidelines*
Coal			
Underground mining	t CH4 / kt coal	13.4	Equations 1 and 4, p. 1.105 and 1.110
Surface mining	t CH4 / kt coal	0.8	Equations 2 and 4, p.1.108 and 1.110
Oil			
Production	t CH4 / PJ	2.5	Tables 1-60 to 1-64, p. 1.129 - 1.131
Transport, refining and storage	t CH4 / PJ	1.6	Tables 1-60 to 1-64, p. 1.129 - 1.131
Total	t CH4 / PJ	4.1	
Natural gas			
USA and Canada			
Production	t CH4 / PJ	72	Table 1-60, p. 1.129
Processing, transport and distribution	t CH4 / PJ	88	Table 1-60, p. 1.129
Total	t CH4 / PJ	160	
Eastern Europe and former USSR			
Production	t CH4 / PJ	393	Table 1-61, p. 1.129
Processing, transport and distribution	t CH4 / PJ	528	Table 1-61, p. 1.129
Total	t CH4 / PJ	921	
Western Europe			
Production	t CH4 / PJ	21	Table 1-62, p. 1.130
Processing, transport and distribution	t CH4 / PJ	85	Table 1-62, p. 1.130
Total	t CH4 / PJ	105	
Other oil exporting countries / Rest of world			
Production	t CH4 / PJ	68	Table 1-63 and 1-64, p. 1.130 and 1.131
Processing, transport and distribution	t CH4 / PJ	228	Table 1-63 and 1-64, p. 1.130 and 1.131
Total	t CH4 / PJ	296	

Note: The emission factors in this table have been derived from IPCC default Tier 1 emission factors provided in Volume 3 of the 1996 Revised IPCC Guidelines, by calculating the average of the provided default emission factor range.

SSC CPAs that don't use natural gas as fuel ie $FF_{project,y} = 0$, will result in $LE_{CH4,y}$ resulting in a negative value, ie negative leakage emissions. Hence$LE_{CH4,y}$ shall be set to cero in such cases

CO_2 emissions from LNG

[17] GHG inventory data reported to the UNFCCC as part of national communications can be used where country-specific approaches (and not IPCC Tier 1 default values) have been used to estimate emissions.

[18] While using values from this table in the equation 6, make the required corrections in the units.

Where applicable, CO_2 emissions from fuel combustion / electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system ($LE_{LNG,CO2,y}$) should be estimated by multiplying the quantity of natural gas combusted in the project with an appropriate emission factor, as follows:

$$LE_{LNG,CO2,y} = FF_{project,y} \cdot EF_{CO2,upstream,LNG} \quad \textbf{(20)}$$

Where:

$LE_{LNG,CO2,y}$	=	Leakage emissions due to fossil fuel combustion/electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system during the year *y* in t CO_2e
$FF_{project,y}$	=	Quantity of natural gas combusted in all element processes during the year *y* in m^3
$EF_{CO2,upstream,LNG}$	=	Emission factor for upstream CO_2 emissions due to fossil fuel combustion/electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system

Where reliable and accurate data on upstream CO_2 emissions due to fossil fuel combustion/electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system is available, project participants should use this data to determine an average emission factor. Where such data is not available, project participants may assume a default value of 6 t CO_2/TJ as a rough approximation.[19]

Leakage emissions for the SSC-CPA, **LE y =** <<>>tCO_2 /yr

D. Emissions Reductions

ERy = BEy – (PEy + LEy)
= <<>> - (<<>> + <<>>)

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

[19] This value has been derived on data published for North American LNG systems. “Barclay, M. and N. Denton, 2005. Selecting offshore LNG process. <http://www.fwc.com/publications/tech_papers/files/LNJ091105p34-36.pdf> (10th April 2006)”.

Data / Parameter	$E_{grid,y}$
Unit	MWh
Description	Amount of grid electricity displaced by project in year y
Source of data	Project site measurement
Value(s) applied	<<>>
Measurement methods and procedures	Measurements are undertaken using energy meters.
Monitoring frequency	Continuous monitoring, hourly measurement and monthly aggregated.
QA/QC procedures	Measurements are undertaken using energy meters certified to national or international standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Used to estimate baseline emissions
Additional comment	Data shall be electronically archived and held for a period of two years from the end of the crediting period. Net electricity generated by the trigeneration power plant system i.e. excluding parasitic loads.

Data / Parameter	$E_{capt,y}$
Unit	MWh
Description	Amount of captive electricity displaced by project in year y
Source of data	Project site measurement
Value(s) applied	<<>>
Measurement methods and procedures	Measurements are undertaken using energy meters.
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording.
QA/QC procedures	Electrical meters certified to national or international standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years. Measurement results shall be cross checked with records for sold/purchased electricity (e.g., invoices/receipts).
Purpose of data	Used to estimate baseline emissions
Additional comment	Only applicable to Project Scenario Type 2 SSC CPAs where the baseline scenario may include captive power plants as the source of power used to run the baseline cooling system and provide the building's electrical needs. Otherwise, please delete.

Data / Parameter	$C_{P,I,y}$
Unit	MWh_{th}/year
Description	Cooling output of the baseline chiller *i* displaced as a result of the installation of project activity in year *y*
Source of data	Project site measurements
Value(s) applied	<<>>
Measurement methods and procedures	Measurements are undertaken using heat meters.
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording.
QA/QC procedures	Heat meters certified to national or international standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years. Cross checked against invoices of cooling sold.
Purpose of data	Used to estimate baseline emissions
Additional comment	Monitored for each chiller *i*

Data / Parameter	$m_{C,i,h}$
Unit	tonnes/hour
Description	The chilled water mass flow-rate for chiller(s) *i* produced by project in hour *h* of year *y*
Source of data	Project site measurements
Value(s) applied	<<>>
Measurement methods and procedures	Measurements are undertaken using flowmeters.
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording.
QA/QC procedures	Flowmeters certified to national or international standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years
Purpose of data	Used to estimate baseline emissions
Additional comment	Metered for each chiller. Mass flow measured by the heat flowmeter when such meter is installed

Data / Parameter	$\Delta T_{C,i,h}$
Unit	°C
Description	Differential temperature for chiller(s) i in hour h of year y of incoming and outgoing water from project
Source of data	Project site measurements
Value(s) applied	<<>>
Measurement methods and procedures	Measured using calibrated temperature sensing equipment.
Monitoring frequency	Continuous, integrated hourly, at least monthly recording.
QA/QC procedures	Measurements are undertaken instruments certified to national or international standards and recalibrated or replaced at appropriate intervals according to manufacturer specifications, but at least once in three years
Purpose of data	Used to estimate baseline emissions
Additional comment	Temperature difference determined by the heat meter when such meter is installed

Data / Parameter	$m_{H,I,h}$
Unit	tonnes/hour
Description	The water mass flow-rate from heater unit(s) i in year y
Source of data	Project site measurements
Value(s) applied	<<>>
Measurement methods and procedures	Measured using calibrated meters.
Monitoring frequency	Continuous, integrated hourly, at least monthly recording.
QA/QC procedures	Measurements are undertaken using flowmeters certified to national or international standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Used to estimate baseline emissions
Additional comment	Mass flow measured by the heat meter when such a meter is installed

Data / Parameter	$\Delta T_{H,I,h}$
Unit	°C
Description	Differential temperature of incoming and outgoing water from heater unit *i*
Source of data	Project Site measurement
Value(s) applied	<<>>
Measurement methods and procedures	Measured using calibrated temperature sensing equipment.
Monitoring frequency	Continuous, integrated hourly, at least monthly recording.
QA/QC procedures	Measurements are undertaken using instruments certified to national or international standards and recalibrated or replaced at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Used to estimate baseline emissions
Additional comment	$\Delta T_{H,I,h}$ measured by the heat flowmeter when such meter is installed

Data / Parameter	$S_{p,y}$
Unit	TJ/y
Description	Thermal energy delivered by the project activity in year *y*
Source of data	Project site measurement
Value(s) applied	<<>>
Measurement methods and procedures	Thermal energy production is determined as the difference of the enthalpy of the steam or hot water generated by the heat generation equipment and the sum of the enthalpies of the feed-fluid and any condensate returns. The respective enthalpies should be determined based on the mass (or volume) flows and the temperatures. Steam tables or appropriate thermodynamic equations may be used to calculate the enthalpy as a function of temperature and pressure In case of equipment that produces hot water/oil this is expressed as difference in the enthalpy between the hot water/oil supplied to and returned by the plant. In case the project activity is exporting heat to other facilities, the metering shall be carried out at the recipient’s end. Measured using calibrated meters.
Monitoring frequency	Continuous, integrated hourly, at least monthly recording.
QA/QC procedures	Measurements are undertaken using instruments certified to national or international standards and recalibrated or replaced at appropriate intervals according to manufacturer specifications, but at least once in three years. Cross checked against invoices for heat sold in the form of steam.
Purpose of data	Used to estimate baseline emissions
Additional comment	

Data / Parameter	T_{st}
Unit	°C
Description	Temperature of Steam
Source of data	Project site measurement
Value(s) applied	<<>>
Measurement methods and procedures	Measured using calibrated temperature sensors.
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording.
QA/QC procedures	Measurements are undertaken using instruments certified to national or international standards and recalibrated or replaced at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Used to estimate baseline emissions
Additional comment	Used to determine enthalpy of steam required to determine $S_{p,y}$ if heat meters are not used

Data / Parameter	P_{st}
Unit	kg/cm^2
Description	Steam Pressure
Source of data	Project site measurements
Value(s) applied	Described in SSC CPA DD
Measurement methods and procedures	Measured using calibrated temperature sensors..
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording
QA/QC procedures	Measurements are undertaken using instruments certified to national or international standards and recalibrated or replaced at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Used to estimate baseline emissions
Additional comment	Used to determine enthalpy of Steam required for the determination of $S_{p,y}$ if heat meters are not used.

Data / Parameter	
Unit	MWh
Description	Quantity of fossil fuel/electricity consumed by the equipment (e.g., chiller, heater, boiler) which remain operational during the project activity during the year y
Source of data	Onsite measurements
Value(s) applied	<<>>
Measurement methods and procedures	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" and "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"
Monitoring frequency	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" and "Tool to calculate baseline, project and/or leakage emissions from electricity consumption
QA/QC procedures	
Purpose of data	Used to estimate baseline emissions
Additional comment	Only applicable to Project Scenario Type 2 SSC CPAs (which are implemented in existing buildings)

Data / Parameter	$FC_{i,j,y}$
Unit	Mass or volume unit per year (e.g. ton/yr or m^3/yr)
Description	Quantity of fossil fuel type j combusted in year y
Source of data	Onsite measurements
Value(s) applied	<<>>
Measurement methods and procedures	Either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift).
Monitoring frequency	Continuously monitored
QA/QC procedures	Meters ccertified to national or international standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift). The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes. Where the purchased fuel invoices can be identified specifically for the CDM project, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records.
Purpose of data	Used to estimate project emissions
Additional comment	

<table>
<tr><td>Data / Parameter</td><td>$NCV_{i,y}$</td></tr>
<tr><td>Unit</td><td>GJ per mass or volume unit (e.g. GJ/m^3, GJ/ton)</td></tr>
<tr><td>Description</td><td>Weighted average net calorific value of 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><th>Data Source</th><th>Conditions for using the data source</th></tr>
<tr><td>a) Values provided by the fuel suppliers in invoices</td><td>This is the preferred source if the carbon fraction of the fuel is not provided (Option A)</td></tr>
<tr><td>b) Measurements by the project participants</td><td>If a) is not available</td></tr>
<tr><td>c) Regional or national default values</td><td>If a) is not available</td></tr>
<tr><td>d) IPCC default values at the upper 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>If (a) is not available</td></tr>
</table></td></tr>
<tr><td>Value(s) applied</td><td><<>></td></tr>
<tr><td>Measurement methods and procedures</td><td>For a) and b): Measurements should be undertaken in line with national or international fuel standards</td></tr>
<tr><td>Monitoring frequency</td><td>For a) and b): The NCV should be obtained for each fuel delivery, from which weighted average annual values should be calculated
For c): Review appropriateness of the values annually
For d): Any future revision of the IPCC Guidelines should be taken into account</td></tr>
<tr><td>QA/QC procedures</td><td>Verify if the values under a), b) and c) are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements. The laboratories in a), b) or c) should have ISO17025 accreditation or justify that they can comply with similar quality standards.</td></tr>
<tr><td>Purpose of data</td><td>Used to estimate project emissions</td></tr>
<tr><td>Additional comment</td><td></td></tr>
</table>

<table>
<tr><td>Data / Parameter</td><td>$EF_{CO2,i,y}$</td></tr>
<tr><td>Unit</td><td>t CO_2/GJ</td></tr>
<tr><td>Description</td><td>Weighted average CO_2 emissions factor of diesel type i in year y</td></tr>
<tr><td>Source of data</td><td>
<table>
<tr><th>Data Source</th><th>Conditions for using the data source</th></tr>
<tr><td>a) Values provided by the fuel suppliers in invoices</td><td>This is the preferred source</td></tr>
<tr><td>b) Measurements by the project participants</td><td>If a) is not available</td></tr>
<tr><td>c) Regional or national default values</td><td>If a) is not available

These sources can only be used on well documented, reliable sources (such as national energy balances)</td></tr>
<tr><td>d) IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol, 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories</td><td>If (a) is not available</td></tr>
</table>
</td></tr>
<tr><td>Value(s) applied</td><td><<>></td></tr>
<tr><td>Measurement methods and procedures</td><td>For a) and b): Measurements should be undertaken in line with national or international fuel standards</td></tr>
<tr><td>Monitoring frequency</td><td>For a) and b): The CO_2emissions factor should be obtained for each fuel delivery from which weighted average annual values should be calculated.
For c): Review appropriateness of the values annually
For d) Any future revision of IPCC Guidelines should be taken into account

For a): If the fuel supplier does provide the NCV value and the CO_2 emissions factor on the invoice and these two values are based on measurements for this specific fuel, this CO_2 factor should be used. If another source for the CO_2 emissions factor is used or no CO_2 emissions factor is provide, Options b), c) or d) should be used</td></tr>
<tr><td>QA/QC procedures</td><td></td></tr>
<tr><td>Purpose of data</td><td>Used to estimate project emissions.</td></tr>
<tr><td>Additional comment</td><td>Applicable where option B is used.</td></tr>
</table>

Data / Parameter	$EC_{PJ,j,y}$
Unit	MWh/yr
Description	Quantity of electricity consumed by the trigeneration system in year y
Source of data	Project site measurement
Value(s) applied	<<>>
Measurement methods and procedures	Measurements are undertaken using energy meters
Monitoring frequency	Continuous monitoring, hourly measurement and monthly aggregated.
QA/QC procedures	Meters certified to national or international standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years. Data shall be electronically archived and held for a period of two years from the end of the crediting period. Data shall be electronically archived and held for a period of two years from the end of the crediting period. Meter location to be selected to ensure that any electricity imported by the trigeneration system is measured
Purpose of data	Used to estimate project emissions
Additional comment	Refers to any electricity drawn from the grid.

Data / Parameter	$Q_{ref,PJ,start}$
Unit	Tonnes
Description	Quantity of refrigerant charge in new cooling equipment at its start of operation (only accounted for in the first year of the first crediting period) (tonnes)
Source of data	Manufacturer’s specifications of the cooling equipment installed
Value(s) applied	Described in SSC CPA DD
Measurement methods and procedures	
Monitoring frequency	Only accounted for in the first year of the first crediting period
QA/QC procedures	-
Purpose of data	Used to estimate project emissions
Additional comment	

Data / Parameter	$Q_{ref,PJ,y}$
Unit	tonnes/year
Description	Quantity of refrigerant used in year *y* to replace refrigerant that has leaked in year *y*
Source of data	Onsite measurements of the quantity of refrigerant used for top up to compensate for the leaked quantity and value for typical refrigerant leakage rate as determined from the Emissions Factors provided in the IPCC 2006 Guidelines, Chapter 7, Table. 7.9 "Estimates for charge, lifetime and emissions factors for refrigeration and air conditioning systems".
Value(s) applied	Described in SSC CPA DD
Measurement methods and procedures	Two options are given in AMS II.K. Version 02.0 **Option A:** using the higher of the two quantities below: (a) The monitored quantity of refrigerant used for top up to compensate for the leaked quantity during the year *y*. based on inventory of refrigerant cylinders consumed in year y, e.g. the total amount of refrigerant ordered as indicated in purchase orders. (b) The typical refrigerant leakage rate for the type of cooling equipment as determined from the Emission Factors (expressed in terms percentage of the initial charge/year) provided in the IPCC 2006 Guidelines, Chapter 7, Table 7.9 "Estimates for charge, lifetime and emissions factors for refrigeration and air conditioning systems". **Option B:** use a default value of 35% of the initial refrigerant charge, i.e. $Q_{ref,PJ,y} = 0.35 * Q_{ref,PJ,start}$
Monitoring frequency	Annually
QA/QC procedures	Quantity of refrigerant ordered is cross checked against invoices (only if option A is chosen)
Purpose of data	Used to estimate project emissions
Additional comment	

Data / Parameter	$FF_{project,y}$
Unit	m³
Description	Quantity of natural gas combusted in the gas consumption sources *i* in the Trigeneration system during the year *y*
Source of data	On –site measurements
Value(s) applied	<< >>
Measurement methods and procedures	As per ACM0009 Measured using calibrated volumetric flowmeters. Continuous monitoring. Integrated hourly and at least monthly recording.
Monitoring frequency	Continuous monitoring. Integrated hourly and at least monthly recording.
QA/QC procedures	Meters to be certified to national or international standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years. The consistency of metered fuel consumption quantities should be crosschecked by an annual energy balance that is based on purchased quantities and stock changes. Where the purchased fuel invoices can be identified specifically for the CDM project, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records
Purpose of data	
Additional comment	Each individual gas consumption source that is part of the trigeneration system does not have to be fitted with a meter as long as it is fed from a line to which other gas consumption sources are connected to and fed from as well. In such cases, the gas consumption data used for monitoring purposes shall be obtained from the gas meter that measures the total of gas consumed by such sources.

The location of the monitoring points is shown Figure 4 below.

Figure 4 Monitoring Diagram

<< insert Monitoring schematic>>

B.7.2. Description of the monitoring plan for a generic CPA

>> The monitoring plan details the actions necessary to record all the data parameters required by the methodology AMS II K Version 02.0 as detailed in section B.7.1 above. Details of the monitoring procedures and frequency of monitoring are described for each parameter in this section. All data will be recorded at the specified frequency.

Monitoring Plan Objective and Organization

<<name of the entity responsible for operation and management of data monitoring and collection>> will operate and manage the data monitoring and collection. <<name of SSC – CPA Implementer>>operatives will be based on site permanently carrying our regular checks and scheduled maintenance. The data collection system will be located on site and supervised by << SSC CPA Implementer name >>personnel.

Monitoring Data and archiving

Data to be monitored will be recorded at the appropriate frequency in accordance with the methodology. <<name of the SSC CPA Implementer >>will be responsible for collecting the monitoring data and calibration certificates where applicable. The data will be archived electronically, backed up regularly, and be stored by << name of the SSC CPA implementer>>, and held for 2 years after the end of the crediting period.<< SSC CPA Implementer >>will provide the Coordinating Entity, i.e.CES Carbon Services Ltd, with full data records and the corresponding calibration certificates. The data will be archived electronically, backed up regularly, and be stored by the coordinating entity for 2 years after last issuance of CERs of this project.

Quality Assurance and Quality Control

<< SSC CPA Implementer>>will implement systems and procedures to ensure the measuring equipment is kept at optimum working condition and being maintained as per manufacturer's requirements. Meters readings verification will take place on regular basis to confirm electronic and hardware readings. The metering devices and instrumentation will be calibrated periodically as per standard industry norms and requirements. All operatives will be adequately trained and familiarized to carry out the required tasks.

4. Other provisions [Only applicable for Project Scenario Type 2 SS CPAs in cases in which baseline energy equipment (power plant, chiller and/or heaters) is removed from the site. If not applicable, please delete]

If the baseline energy equipment (power plant, chiller and/or heaters) is to be removed from the site the SSC-CPA shall provide the CME with evidence that the equipment in question has been destroyed. Destruction of the equipment shall be witnessed, photographed (still and video), and certified by an independent third party, such as, a government official, university lecturer or another independent party.

*Part II. Generic CPA for cogeneration projects

Part II. Generic component project activity (CPA)

SECTION A. General description of a generic CPA
A.1. Purpose and general description of generic CPAs
>>
The SSC-CPA is a cogeneration project implemented by << name of SS CPA Implementer>> under the " Advanced Energy Solutions for Buildings. Programme of Activities (PoA)" coordinated by CES Carbon Trading Ltd.

The cogeneration system is to be built in the << name of the building>>. The<<name of the building>> is a <<new/existing delete as appropriate>> construction that comprises << describe the service that the building provides>>and <<is to be built in / that has been built in (delete as appropriate)>> in the << name of city >>.

The cogeneration project aims to meet the<< name of site where the project is to be built>>'s <<power, space cooling and heat requirements (indicate which two of these services are produced)>>in a more energy efficient and less carbon intensive way than a <<conventional system typically would have / the existing systems would have (delete as appropriate>>, in which electricity requirements would have been met from the << indicate source from which the electricity that the SSC-CPA produces would have otherwise come from>> and <<space cooling requirements would have been met using << indicate how the cooling produced in the SSC-CPA would have otherwise been produced, >> (in the case where waste heat is used to produce cooling)>> <<hot water /steam (delete as appropriate>>) would have been

generated using << indicate technology that would have been otherwise used to produce hot water /steam>>(in the case where waste heat is used to produce hot water/steam)>>.

The proposed scheme includes the installation of the << indicate technology and energy source used to generate electricity in proposed SSC-CPA>> to produce the electricity required by the building. Waste heat from the power plant is used as a source of heat to <<run <<type of chiller and working fluid used>>absorption chillers which are to produce the chilled water required to meet the buildings space cooling requirements (delete if the waste heat is not used for cooling)>> to produce<< hot water/steam/additional electricity (delete as appropriate) (delete if waste heat is only used to produce cooling)>>. << If new, high efficiency electric chillers are also to be installed as part of the SSC CPA indicate the type of refrigerant used and whether such chillers are an integral part of the cogeneration system's design or used as a backup>>. The resulting combination of technologies leads to significant savings in energy and GHG emissions.

The proposed SSC-CPA prevents a more carbon intensive system to be installed at << name of the site where the proposed SSC-CPA is to be built>>, and is estimated to result in the reduction of <<>>tCO_2/yr.

The SSC-CPA is to be implemented as a << indicate the business modality under which the proposed SSCCPA is to be developed, ie as ESCO service, EPC contract etc>>, whereby << name of the proposed SSC-CPA Implementer>>is paid for the electricity, cooling and heat it provides to the owner of the building.

The project contributes to the achievement sustainable development goals in the << name of host country>>:

Diversification of and conservation of energy sources

- The SSC CPA introduces more efficient forms of meeting electrical power and <<space cooling (delete if cooling is not generated)>> << heating needs(delete if heat is not generated)>> in commercial and institutional buildings.

- <<Cooling loads in buildings in << name of the host country>> are very large, and constitute the single most important energy load in buildings. The SSC CPA introduce an energy efficient building solution that involves amongst other features the production of chilled water by means of << indicate the cooling technology applied>>. The installation of the proposed system is expected to reduce the amount of energy that would have otherwise have had to been used to meet the building's energy needs ,by approximately <<>>GWh/yr, thus saving fossil fuels that would have otherwise have had to been consumed to generate such energy.(delete if the waste heat is only used for heat generation purposes)>>

Economic sustainability

The SSC CPA will contribute to the employment by providing opportunity of new jobs for local community starting from construction to commissioning, and thereafter throughout the ongoing operation and maintenance of the a highly advanced building energy solution.

The SSC CPAs to be implemented under the PoA are optimized energy solutions that require highly trained staff to operate and maintain them. CES Carbon Services Ltd will ensure that staff involved in the operation of such installations receive the necessary training to perform their duties.

Each SSC CPA will act as a clean technology showcase and should serve to encourage building designers, constructors, owners and operators to consider such schemes as a means of meeting a building's energy requirements in a more efficient and less carbon intensive manner.

Social sustainability

The PoA will implement advanced energy solutions which will be operated and maintained to ensure the safe operation of such installations. SSC CPAs will create jobs and will serve as examples of advanced efficient technological solutions which can be replicated in other parts of the country. The SSC CPAs serve as a means to foster a greater understanding of the practical aspects surrounding the operation of advanced energy, cooling and heating building solutions under local conditions. Local Higher Education entities will be able to access these installations via guided tours to enhance their practical understanding of advanced energy, cooling and heating solutions.

Environmental sustainability

The SSC-CPA introduces less greenhouse gas intensive form of meeting the electrical power and << space cooling / hot water needs (indicate which of the two is applicable) >> in << name of site where the proposed SSC-CPA is to be built >>by reducing the amount of energy needed to provide them. The cogeneration system to be implemented will reduce the amount of energy that would have otherwise been used to meet the << name of the site where the proposed SSC-CPA is to be built >>'s energy needs by reducing the amount of power drawn from << the grid or/and captive fossil fuel fired systems (delete as appropriate) >> and thus reduce the amount of CO_2 emissions, as well as other pollutants resulting from the combustion of the fossil fuel that is saved and which would have otherwise have had to been used, are also reduced as result.

Cooling loads in << host country name>>are large, and constitute the single most important energy load in buildings. The cogeneration system introduces efficient and low carbon<< indicate the cooling technology used (delete if cooling is not produced >>.

It will reduce the amount of energy that would have otherwise been used to meet the << name of the site where the proposed SSC-CPA is to be built >>'s energy needs by harnessing the waste heat to provide <<cooling (delete if not applicable>> <<hot water/steam/additional power (delete as appropriate)>>. In so doing the project reduces the amount of the emissions that would have otherwise been produced to meet the building site's electrical, <<cooling (delete if cooling is not produced)>> <<hot water/steam(delete if waste heart is not used to meet heating loads)>> loads. Moreover, this same reduction in fossil fuels leads to a reduction in emissions of other gaseous pollutants that result from the combustion of fossil fuels.

Technology sustainability

<<name of the SSC CPA implementer>>has expertise in building and operating cogeneration systems. The << name of the site where the proposed SSC CPA is to be installed>> will be fitted with a modern cogeneration system that will serve also to showcase the technology, as one which is more efficient and less greenhouse intensive than the systems that are commonly installed in the similar buildings in the << name of the host country>>, but which is also a reliable proposition. The project will contribute to raising awareness to the advantages of the technology and build up confidence in the market about to the benefits that result from the implementation of high efficiency and low carbon solutions.

The project will provide an opportunity for local people to acquire know-how for the optimal maintenance and operation of state-of-the-art tri-generation systems, as the case may be; and

The project will contribute to provide opportunity of technology transfer.

SECTION B. Application of a baseline and monitoring methodology

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

>>

Referring to the UNFCCC CDM web-site, as per appendix B to the simplified modalities & procedures for small scale project activities, the sectoral scope, type and category and methodology applicable to SSC CPAs developed under the proposed PoA are:

Sectoral scope : 03
Type : Type II – Energy Efficiency Improvement Projects
Category : AMS II K, *"Installation of co-generation or tri-generation systems supplying energy to commercial buildings"*.

Any SSC CPA will also apply the following tools and guidelines, as per the requirements of AMS II K / Version 02.0:

"*Tool to determine the remaining lifetime of the equipment" (Version 01)*

"General Guidelines to SSC CDM methodologies" (Version 19)

"*Tool to calculate project or leakage CO2 emissions from fossil fuel combustion"(Version 02)*

"*Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01)*

"Consolidated baseline and monitoring methodology for fuel switching from coal or petroleum fuel to natural gas" ACM0009/ Version 03.2

B.2. Application of methodology(ies)

>> Baseline and Monitoring Methodology AMS II.K/Version 02.0 is applied in this PoA because the SSC CPAs to be implemented under the PoA consist in the installation of trigeneration or cogeneration systems supplying energy to commercial buildings and which result in energy savings that do not exceed 60 GWh per year throughout the crediting period and meet the applicability criteria given in AMS II.K / Version 02.0.

Table B.2.1: Cogeneration SSC CPA Compliance with AMS II K Version 02.0 Applicability criteria

The applicability criteria of AMS II K. Version 2.0	**How the cogeneration SSC-CPA complies to AMS II. K and the means whereby this can be confirmed depending on the Project Scenario Type that the SSC-CPA implements:**

1.This methodology applies to the installation of fossil fuel based co-generation that simultaneously produce electricity and cooling (e.g., chilled water) or heating (e.g., steam or hot water) for supplying such energy to commercial, non-industrial, buildings.	1. <<>>	Project description and simplified schematic as described in the SSC - CPA DD
2. The methodology is applicable to installation of new cogeneration systems that replace or supplement either: the operation of (a) existing systems that supply electricity (grid or on-site generation) and cooling (e.g., chillers) or heating systems (e.g., boilers) or (b) electricity and cooling and/or heating systems that would have been built and utilized.	2. <<>>	Project description and schematic as described in the CPA DD
3. The methodology does not apply to the replacement of existing co-generation system.	3.<<>>	[Choose the applicable project scenario type and delete the text corresponding to other scenario type] Project scenario Type 1. Not applicable, hence no evidence is required to confirm compliance
		Project scenario Type 2. Drawings of the existing facilities and signed declaration from the CPA Implementer
4. If it is identified that the baseline situation is the continued use of an existing system then the existing system must have been in operation for at least the immediately prior three years, to the start date of the project activity, in order to ensure that adequate baseline performance data are available	4.<<>>.	[Choose the applicable project scenario type and delete the text corresponding to other scenario type] Project scenario Type 1. Not applicable –no evidence required
		Project scenario Type 2. Plant log book data or other plant reports, e.g. maintenance records, that show that the building's energy system have been in operation at least for the last three years counting back from the start date of the

		proposed SSC-CPA.
5. This methodology only applies to commercial, non-industrial applications. Projects that comprise energy efficiency measures implemented through integration of a number of utility provisions (for example, integrating power, steam/heat and cooling systems) of an industrial facility cannot apply this methodology.	5.<<>>	[Choose the applicable project scenario and delete the text below corresponding to other scenario type the not applied scenario] Project Scenario Type 1: Feasibility study or Construction plans or simplified drawings or project promotional brochures describing the building's application. Project Scenario Type 2: Publicly available literature describing the building, eg. brochures, advertisements, drawings, etc
6. For the purpose of this methodology, natural gas is defined as a gas which consists primarily of methane and which is generated from (i) natural gas fields (non-associated gas), (ii) associated gas found in oil fields. it may be blended up to 1% on a volume basis with gas from other sources, such as, *inter alia*, biogas generated in biodigesters, gas from coal mines, gas which is gasified from solid fossil fuels, etc.[20]	6. <<>>	<<Not applicable given that as per (insert reference) natural gas will not be used in the proposed SSC-CPA / As per (insert reference) natural gas is blended with gas from other sources, that the concentration of gas from such sources does not exceed 1% on a volume basis >>
7. Any chilled water/cooling or steam/hot water/heat and electricity produced by the cogeneration system must be used on-site (within the project boundary) to meet all or part of the energy demand. Existing chillers, boilers, electrical heaters, electricity generating units, etc. may remain in operation after the implementation of the project activity	7. <<>>	[Choose the applicable project scenario type and type delete the text below corresponding to the other scenario type] Project Scenario Type 1. Not applicable. In the case of SSC-CPAs pursued in buildings that are yet to be built no equipment exists.

[20]This limitation is included because the methodology does not provide procedures to estimate the GHG emissions associated with the production of gas from these other sources.Project activities that use gas that does not comply with this definition must apply for a revision of the methodology.

to either (a) supply the balance of the demand not met by the cogeneration system if the cogeneration system has insufficient capacity to supply the total energy demand and/or (b) provide backup to the cogeneration system. However, emission reductions can only be claimed for the cooling or heat and electricity produced by the new cogeneration system.		Project Scenario Type 2. Log book information to show that the existing plant is in operation. Utility drawings of the existing system showing the points where the new cogeneration system components tie into.<< If the chilled water to be produced by the proposed SSC-CPA is to share an existing chilled water distribution piping network, please show where the proposed system would it tie into the existing one. The same applies to any heat being generated by the cogeneration system if applicale.>>
8. The energy savings caused by a single project activity may not exceed the equivalent of 60 GWh per year. A maximum saving of 60 GWh is equivalent to maximum savings of 60 GWh_e of electricity consumption or maximum savings of 180 GWh_{th} of fuel consumption, i.e., for calculation of maximum savings allowable per year, 1 GWH_e equals 3 GWH_{th}.	8. The Proposed SCA-CPA results in equivalent energy savings of <<>>GWh/yr.	Energy savings calculations presented by the CME or by project CPA implementer but revised by the CME
9. The project activity can include installation of cooling equipment which use refrigerants only if such refrigerants have no ozone depleting potential (ODP) and if such installation is not mandated by laws or regulations.	9. The Proposed SSC CPA involves the use of <<>> chillers, which have no ODP	Cooling Equipment design specifications, feasibility study.
10. In case the produced electricity, cooling and/or heat are delivered to a facility that is not owned or under the control of the project owner, a contract between the project owner and consumer of the energy must be in force, during the crediting period, specifying that only the facility generating the energy can claim CERs from the emissions displaced by the subject project.	10. <<>>	Agreement between the-CPA Implementer, and the << name of the purchaser of the energy produced by the SSC CPA >>

B.3. Sources and GHGs

>> The gases and sources relevant to the Project are listed below based on the methodology AMS II version 02.0.

Table B.3.1 - Summary of Gases and Sources included in project boundary

	Source	Gas	Included?	Justification / Explanation
Baseline	Grid/Captive power plant Electricity generation	CO_2	Yes	Main Emission source.CO_2 emissions from the combustion fossil fuel in grid connected and/or captive power plants to produce the electricity used to meet the building's electricity demands excluding emissions associated with the power needed to run the chiller plant in the absence of the project activity.
		CH_4	No	Excluded for simplification and conservativeness. Expected to be minimal
		N_2O	No	Excluded for simplification and conservativeness. Expected to be minimal
	Chilled water plant (delete if waste heat is used only to meet the sites heat loads)	CO_2	Yes	Main Emission source.CO_2 emissions from the combustion of fossil fuel in the grid connected and/or captive power plants to produce the electricity used to run the chiller plant in the absence of the project activity.
		CH_4	No	Excluded for simplification and conservativeness. Expected to be minimal
		N_2O	No	Excluded for simplification and conservativeness. Expected to be minimal
	Hot water production (delete if that waste heat is only used to produce cooling)	CO_2	Yes	<< Choose as applicable: Not applicable / Main emission source. CO_2 emissions or associated with the electricity which is used or assumed to be used, to produce hot water>>
		CH_4	No	<< Choose as applicable: Not applicable / Excluded for simplification and conservativeness. Expected to be minimal>>
		N_2O	No	<< Choose as applicable: Not applicable / Excluded for simplification and conservativeness. Expected to be minimal>>
	Steam production (delete if not produced)	CO_2	Yes	<< Choose as applicable: Not applicable / Main emission source. CO_2 emissions from the combustion fossil fuel used to produce steam.>>
		CH_4	No	<< Choose as applicable: Not applicable / Excluded for simplification and conservativeness. Expected to be minimal>>
		N_2O	No	<< Choose as applicable: Not applicable / Excluded for simplification and conservativeness. Expected to be minimal>>
Project	Cogeneration power plant fossil fuel combustion	CO_2	Yes	Main emission source.CO_2 emissions from combustion of<< fossil fuel used >> name used by the <<Trigeneration/cogeneration (delete as appropriate) system's power plants as per the

				"Tool to calculate project or leakage CO_2emissions from fossil fuel combustion"
		CH_4	No	Excluded. Expected to be minimal
		N_2O	No	Excluded. Expected to be minimal
	Electricity consumed by the Cogeneration system that is sourced from the grid	CO_2	Yes	Main Emission source. CO_2 emissions from << describe source >> <<, and calculated as per the tool to calculate baseline, project and/or leakage emissions from electricity consumption (if applicable; otherwise delete this last sentence)>>.
		CH_4	No	Excluded. Expected to be minimal
		N_2O	No	Excluded. Expected to be minimal
	Physical leakage of refrigerant from new cooling equipment	Refrigerants that are GHGs	Yes	Emissions from this source are to be included if a new chiller uses a non ODP refrigerant with a GWP greater than cero

The SSC-CPA is to be implemented in the City of << name of city where the SSC-CPA is to be built>>, which is located in the << host country name >> and thus, in the geographical boundary of the PoA as shown in the figure below.

Figure 4. Location of the proposed SSC-CPA in relation to the Geographical Boundary of the PoA

<< insert host country map showing location of the proposed SSC CPA>>

B.4. Description of baseline scenario

>> The SSC-CPA introduces a cogeneration system, either in buildings that are yet to be built or buildings that already exist. There are thus two types of Project Scenarios that are catered for by the proposed PoA .

The baseline scenario for any SSC CPA can be described in terms of a combination of the following:

d) A source of electricity, which is typically imported from the grid and/or produced by an onsite captive power plant
e) A means of providing space Cooling (e.g. chilled water) is produced in a vapor compression system driven by electricity, or
f) A means of providing heat (e.g. in the form of hot water or steam) which is produced using fossil fuel or electricity

For each of the two types of project scenarios mentioned above, AMS IIK Version 02.0 describes how the baseline scenario for the purpose of establishing what the emissions would have been is to be identified and what form such baseline scenarios take.

SSC CPA implementers shall indicate in the SSC-CPA DD which Project Scenario Type their SSC-CPA conforms to:

Project Scenario Type 1 SSC CPA: The SSC CPA replaces systems that would have been built

In this project scenario a new cogeneration system replaces the operation of electricity and cooling and/or heating systems that would have otherwise been built. In this case, a " Reference Plant" is to be defined as the system that would have otherwise been built and thus constitutes the baseline scenario for the purpose of determining the baseline emissions, in accordance with AMS II.K/Version 02.0.

Such a "Reference plant" is based on what is considered to be common practice for cooling and heating systems of similar capacity and sources of electricity used in the same commercial sector. Such a reference plant shall be taken as the basis upon which to determine the baseline emissions for this Project Scenario Type.

Baseline Reference plant

As per AMS II.K Version 02.0, in cases where the baseline scenario consists of the installation of new cooling and /or heating systems and/or the utilisation of new electricity sources, a baseline Reference Plant shall be defined as the baseline scenario for the purpose of establishing the baseline emissions. The Reference Plant in the context of cogeneration SSC CPAs is based on common practice for similar capacity, new heating or cooling systems and sources of electricity in the same commercial sector and in the same country or region as that of the proposed SSC CPA. The identification of the Reference Plant should exclude plants implemented as CDM project activities.

The common practice analysis used to determine the Reference Plant considers sources and equipment/systems that provide similar outputs and services and that are in compliance with relevant regulations that would have been installed otherwise in the host country, and which shall include:

Host country: Kingdom of Saudi Arabia

Source of electricity:

The source of electricity to meet the building's power needs: the electricity grid

Technology used to provide space cooling:

The technology used to provide chilled water in new Air Conditioning System plant in commercial applications in the Kingdom of Saudi Arabia comprise:

- Electrically driven vapour compression air cooled chillers
- Split AC systems

This is based on CES Energy's knowledge of the sources of energy and technologies used in buildings in the Kingdom of Saudi Arabia and has been confirmed by engineering consultants active in this market[21]
For the sake of simplicity and conservativeness in the determination of the baseline emissions, it is assumed that electrically driven chillers are used as the baseline reference space cooling technology in the Kingdom of Saudi Arabia given their higher COP compared to Split systems. Moreover, the highest full load COP provided by two or more manufacturers for chillers commonly used in the Kingdom of Saudi Arabia has been taken as the COP of the cooling technology that is part of the Baseline Reference Plant

Technology used for supplying hot water in new hot water systems:

Common practice in the kingdom of Saudi Arabia is the use of electrical heaters.

Technology and source of energy used to generate steam

Common practice in the kingdom of Saudi Arabia is the use of Diesel fuel fired boilers

[21] MTMM Engineering Consultants. Jeddah 21423, Kingdom of Saudi Arabia. Dec 2011

Host country: Oman

Source of Electricity

The source of electricity to meet the building's power needs: The electricity grid.

Technology used to provide space cooling:

The technology used to provide space cooling in commercial applications in Oman consists of electrically driven vapour compression air cooled chillers and split AC systems. For the sake of simplicity and conservativeness in the determination of the baseline emissions, it is assumed that electrically driven chillers are used as the baseline reference space cooling technology in Oman given their higher COP compared to Split systems

Technology used for supplying hot water in new hot water systems:

Common practice in Oman is the use of electric heaters

Technology and source of energy used to generate steam:

Common practice in Oman is the use of diesel fuel fired boilers

The above is confirmed by Mohamed A. Turki Mott Mac Donald MTMM Engineering Consultants who are active in this market [9] and air conditioning manufacturers Daikin McQuay's Middle East [11]

Host country: Egypt

Source of Electricity

The source of electricity to meet the building's power needs: The electricity grid

Technology used to provide space cooling:

The technology used to provide space cooling in commercial applications in Egypt consists of electrically driven vapour compression air cooled chillers and split AC systems. For the sake of simplicity and conservativeness in the determination of the baseline emissions, it is assumed that electrically driven chillers are used as the baseline reference space cooling technology in Egypt given their higher COP compared to Split systems.

Technology used for supplying hot water in new hot water systems:

Common practice in Egypt is the use of electric heaters

Technology and source of energy used to generate steam:

Common practice in Egypt is the use of diesel fuel fired boilers.

The above is confirmed by Mohamed A. Turki Mott Mac Donald MTMM Engineering Consultants who are active in this market [9] and Cgroup (electro mechanical consultant) Engineering Consultancy[22]

For the sake of simplicity and conservativeness in the determination of the baseline emissions, it is assumed that electrically driven chillers are used as the baseline reference space cooling technology in the above countries given their higher COP compared to Split systems. Moreover, the highest full load COP provided by two or more manufacturers for chillers commonly used in each of these countries has been taken as the COP of the cooling technology that is part of the Baseline Reference Plant

Project scenario Type 2 SSC CPAs: the CPA replaces/supplements the operation of existing systems that supply electricity (grid or onsite generation) and cooling (eg. chillers) or heating systems (e.g hot water boilers).

In this Project Scenario Type, the Cogeneration system that is to be installed replaces/supplements the operation of existing systems that supply electricity (grid or onsite generation) and cooling (eg. chillers) or heating systems (e.g hot water heaters or steam boilers).

The baseline scenario for this project scenario type is defined in accordance to AMS II.K/Version 02.0 as being one of the two following options:

Option a) The continued operation of the existing systems may be selected as the most plausible option for the purpose of determining the baseline emissions:

iv) If the total consumption of energy (electricity, cooling or heating) by the commercial buildings that consume this energy does not increase by more than 20% from the established baseline values, i.e., the annual energy consumption during the crediting period shall not be 20% higher that the historical values of energy consumed by the consumers. If such condition is met then the baseline emissions shall be established from the characteristics of the existing systems, using data from the immediately prior three years (to the date of the project start up)

v) If during the crediting period, the total annual consumption of energy (electricity, cooling or heat) does increase by more than 20% with respect to the established baseline values it can be demonstrated using the related and relevant procedures prescribed in the SSC general guidance that the most plausible baseline scenario for the supply of additional amounts of energy would be the continued use of the existing systems. This shall include demonstrating that the existing system has the capacity to meet that increased energy demand.

The stepwise approach to be followed in such cases is the following, based on the General Guidelines to SSC CDM methodologies (Version 17) EB61.

Step 1. Define alternatives available to the SSC CPA implementer that deliver the same quantities and quality of electricity, cooling or heat, including the proposed project activity undertaken without being registered as a CDM project activity under the PoA

This shall include:

[22] Cgroup (electro mechanical consultant) Engineering Consultancy, Nasr City, Egypt

- The existing system meeting the additional (incremental) demand for energy

- The existing system is replaced by the new and more efficient systems (the baseline reference plant)

- The existing system being replaced with a cogeneration system

Step 2. List the alternatives indentified per Step 1 that are in compliance with local regulations, and exclude from further consideration any alternative that is not in compliance with such regulations.

Step 3. Eliminate and rank the alternatives remaining in Step 2 taking into account barrier tests specified in EB 68 Annex 27. Guidelines on the Demonstration of additionality of small scale project activities. (Version 09.0)
The NPV of the costs for each alternative shall be presented, using the same approach described in section E.5.1.

Step 4. If it is determined that the alternative to meet the incremental energy consumption with the least NPV cost is the continued operation of the existing systems then the characteristics of such systems can be used to determine the baseline emissions. Otherwise, the baseline Reference Plant as described above in the section titled “Baseline reference plant” that corresponds to the host country in which the proposed SSC CPA is to be implemented shall be chosen as the baseline scenario.

vi) If it can be demonstrated that irrespective of what the baseline total annual energy consumption may have been or what the total annual energy consumption may be during the crediting period, that a new, more efficient system wouldn’t have been installed in the absence of the project activity.

For example, if a new, more efficient system would have been installed as a result of the existing system reaching the reached the end of its useful life during the crediting period or because there is not sufficient information available to apply the “Tool to determine the remaining lifetime of equipment” to establish the point in time when the existing plant would have had to been replaced anyhow, then the continued operation of the existing system shall not be considered to be the baseline scenario. In such cases, the baseline scenario shall be the baseline Reference Plant as described above in the section titled “Baseline reference plant” that corresponds to the host country in which the proposed SSC CPA is to be implemented in .

The following stepwise approach shall be applied to establish if a new system might have been installed or not:

a) Determine the remaining lifetime of the existing system as per the “Tool to demonstrate the remaining lifetime of equipment”.

Existing systems will typically comprise a number of chillers, and in some cases, captive power plant generators, each with their own remaining lifetime. The remaining lifetime for each item of such items plant shall be presented in the SSC CPA DD. The point in time at

which the existing systems would he replaced is determined conservatively[23] by establishing the earliest point in time at which any of the chillers or generators would have to be replaced be replaced anyhow, thus triggering the need to install a new system.

b) If the end of the crediting period of the SSC CPA lies before the point in time at which the system would have been replaced then the baseline scenario may be taken to be continued operation of the existing system subject to the conditions set out i) and ii) above.

Option b) The installation of a new, more efficient system or "Baseline Reference plant " shall be taken to be the baseline scenario for the purpose of determining the baseline emissions, if

c) It is determined that a new and more efficient system (as compared to the existing system) would have been installed in the absence of the project activity as per iii) above, or

d) The SSC-CPA implementer chooses to assume, in order to simplify the process of identifying the baseline scenario for the purpose of determining the baseline emissions (eg. due to the lack of sufficient information to demonstrate in line with the "Tool to determine the remaining lifetime of the equipment") that the existing systems would be replaced after the end of the crediting period and thus provide for greater conservativeness in the emissions reductions calculation, that the baseline scenario is the installation of a new and more efficient system. Such a more efficient system being defined in accordance to the approach provided in AMS II.K/version 02.0 to determine the baseline Reference Plant, as described above. In such case, the Baseline Reference Plant chosen shall be that which corresponds to the host country in which the proposed SSC CPA is to be implemented in, as described above in the section titled "Baseline reference plant" where the baseline reference plants for the various host countries considered in this PoA are presented.

SSC CPA implementers seeking to implement Project Scenario Type 2 SSC CPAs shall describe in Annex of 3 of the corresponding SSC CPA DD form which of the two options a) or b) above is to be taken as the baseline scenario

The identified baseline scenario for any of the two Types of SSC CPA conforms to the legal requirements of the host countries covered by the PoA. Moreover the installation of the project activity is not mandatory by any laws. ie the technologies that are currently used and which could continue to be used in existing buildings, or be installed in new buildings in the absence of the PoA all comply with the existing regulations. There is no restriction concerning the use of electric chillers to provide chilled water for cooling in buildings, nor is there any restriction in generating hot water or steam to meet a commercial building's heat requirements from electricity or fossil fuels, nor any impediment to sourcing power from the grid or from a captive power plant in any of the host countries considered in the PoA. Moreover, the installation of cogeneration systems in commercial buildings is not mandated by any laws in any of the host countries considered in this PoA.

[23] As per the "Tool to determine the remaining lifetime of equipment", footnote 1: when the tool is applied to determine the remaining lifetime of baseline equipment for the use in calculation of baseline emissions, the lower value within the range shall be considered

B.5. Demonstration of eligibility for a generic CPA

>> The proposed SSC-CPA is eligible to be included in the Advanced Energy Solutions for BuildingsProgramme of Activities because it meets all the relevant eligibility criteria laid out in the SSC PoA DD as shown in tables B2.1 and B2.2 :

Table B.5.1 SSC-CPA Inclusion Eligibility Criteria Compliance

	Eligibility criteria	**How the SSC CPA meets the eligibility criteria and examples of Reference or supporting documentation that can provided to support such claim**
	The Geographical boundary of the CPA shall be within the geographical boundary of the PoA	Geographical coordinates of the site where the SSC CPA is to be built showing its relation to the boundary of the PoA
	The CPA implementer shall demonstrate that the project activity shall not lead to double counting of Emission Reduction by confirming that this project activity shall not be a part of any of the below mentioned categories post approval of the project activity under CDM: (1) Standalone CDM project activity, (2) Bundled CDM project activity, (3) Another registered PoA.	Information provided in the Record Keeping System and assessment of the information thereof, carried out in accordance with doublecounting avoidance check described in section A 4.4.1 *(iii)* of the PoA DD and described in the SSC CPA DD of the SSC CPA seeking inclusion in the POA.

<table>
<tr><td></td><td>Shall consist of fossil fuel based co-generation system to supply electricity and <<cooling / heating (delete utility that is not produced)>> in non-industrial buildings in which the main items of plant equipment where applicable shall comply with following specifications and certifications
<table>
<tr><th>ITEM</th><th>CAPACITY RANGE</th><th>CERTIFICATIONS REQUIRED</th><th>OTHER DETAILS</th></tr>
<tr><td>Fossil Fuel Fired Turbine</td><td>2 MWe – 20 MWe</td><td>Tested to ISO 2314:2009 (or equal and approved)
Electrical Efficiency to be > 20% on a NCV basis</td><td></td></tr>
<tr><td>Fossil Fuel Fired IC Engine</td><td>500 kWe – 4 MWe</td><td>Tested to ISO 3046 (or equal and approved)
Electrical Efficiency to be > 25% on a NCV basis</td><td>Hot water output temperature range 60°C – 120°C</td></tr>
<tr><td>Chiller</td><td>150TR – 4000TR</td><td>AHRI, ANSI, BS, EN, ISO or equal and approved</td><td>Chilled water temperatures from 0 °C to 10 °C</td></tr>
<tr><td>High Efficiency Electric Chillers</td><td>100-4000TR</td><td>AHRI, ANSI, BS, EN, ISO or equal and approved</td><td>Chilled water temperatures from -5°C to 15°C</td></tr>
<tr><td>Heat Recovery Steam Boiler</td><td>0.5 t/h – 25 t/h</td><td>PED 97/23/EC (or equal and approved)</td><td>Pressures in range 1 bar – 30 bar
Temperatures in range 120 °C – 400 °C</td></tr>
</table></td><td>Any of the following: Detailed project report, FSR, quotation from technology provider, purchase order, EPC, statement from the SSC CPA implementer, etc.</td></tr>
<tr><td></td><td>Start date of the CPA is not, or will not be, prior to the date on which the CDM-PoA-DD is first published for Global Stakeholder consultation</td><td>Any one of the following: EPC contract, equipment purchase order, unless such documentation does not exist because the SSC CPA has yet to start.</td></tr>
<tr><td></td><td>Meet baseline and monitoring methodology AMS II.K requirements as given in Section B.2 Table B.2.1 for new and existing buildings</td><td>Please refer to Section</td></tr>
</table>

		B2. Table B.2.1
	The proposed CPA is a voluntary initiative by the CPA implementer. The CPA implementer is not implementing a mandatory policy or regulation	Signed declaration by the SSC CPA implementer confirming that the measure is a voluntary (non mandatory) one, and third party documentation to confirm such claim (e.g from third party consultants or Govt. entities, etc).

	The Project Pre Tax IRR of the proposed CPA based on parameters and sources given in Table B.5.2 below must be less than the applied Pre Tax WACC benchmark based on the following parameters and sources presented in Table B.5.3 below. This eligibility criterion is applicable to project scenarios in which the CPA implementer is a third party investor (e.g. a technology promoter, ESCO, etc) invests in the project and sells the electricity, cooling and heat that is produced, i.e. has the choice to make the investment or not). Additionality shall not be assessed by any of the other barriers listed in EB 68 Annex 27. Guidelines on the Demonstration of additionality of small scale project activities. (Version 09.0).	WACC (pre tax based) Benchmark Analysis presented as part of the corresponding CPA DD submission.

Parameters	Description	Example of Sources
RFR	Risk Free Rate in a mature equity market	U.S long-term government bond. Source: eg. http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2010
ß unlevered	Beta (unlevered)	Total Beta (Unlevered) from Damadoran (Stern University) for the relevant sector; most recent year data before the investment decision was made. Source: eg. ttp://pages.stern.nyu.edu/~adamodar/ “Total Beta by industry sector”
RP	Total Risk Premium	Source:http://pages.stern.nyu.edu/~adamodar/ "Risk Premium for other Markets"
SP	Size Premium.	Source. The Size risk premium can be sourced from the “Ibbotson SBBI valuation yearbook” published by Morningstar Inc
CD	Cost of Debt	The yield of a 10 year bond issued by the government of the Host country, if this is not available, the bond with the maturity which is closest to 10 years can also be used. The value of cost of debt can also sourced from the host country Central Bank or any other relevant evidences.
%Debt	% of finance from debt	Based on the finance structure of the project. If debt/equity finance structure is not yet available, 50% debt may be assumed As per EB 62, Annex 5, Para 17, 18
%Equity	% of finance from equity	Based on the finance structure of the project. If debt/equity finance structure is not yet available, 50% equity may be assumed As per EB 62, Annex 5, Para 17, 18
D/E	Debt to Equity ratio	Calculation
CE	Cost of Equity, ie Average expected return on equity	Calculated as per the CAPM eqn.

	There is an alternative, more GHG intensive means of meeting the building's electricity, cooling and heat requirements which has a lower NPV cost than that of the proposed CPA. This eligibility criterion is applicable to project scenarios in which the CPA implementer would have made an investment anyway). Additionality shall not be assessed by any of the other barriers listed in EB 68 Annex 27. Guidelines on the Demonstration of additionality of small scale project activities. (Version 09.0)	NPV Cost comparison analysis presented as part of submission of corresponding SSC CPA DD applying such approach.
	An agreement shall be in place between the CPA implementer and the Coordinating and Managing Entity (CME), authorizing the CME to include the CPA into the PoA and therefore ceding the carbon rights to the CME.	ERPA or any other document signed between the SSC CPA implementer where the CPA implementer cedes the rights the carbon rights to the CME.
0	The proposed SSC CPA does not receive any Annex 1 parties funding, or if it does, such funding does not result in a diversion of official development assistance.	Written affirmation that if funds from Annex 1 funds are used, that such funding does not result in a diversion of official development assistance from the donor party.
1	The energy savings caused by a single project activity may not exceed the equivalent of 60 GWh per year. A maximum saving of 60 GWh is equivalent to maximum savings of 60 GWh_e of electricity consumption or maximum savings of 180 GWh_{th} of fuel consumption, i.e., for calculation of maximum savings allowable per year, 1 GWH_e equals 3 GWH_{th}.	Energy savings calculations presented by the CME or by project CPA implementer but revised by the CME
2	The Proposed SSC CPA is not a debundled component of a large scale activity. SSC CPA shall demonstrate compliance with the EB 54 Annex 13 "Guidelines on assessment of de-bundling for SSC project activities". The CPA is considered as debundled if both conditions (a) and (b) below are satisfied: c. Has the same activity implementer as the proposed small scale CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same technology/measure, and;	Information provided in the Record Keeping System and assessment of the information thereof, carried

	d. The boundary is within 1 km of the boundary of the proposed small-scale CPA at the closest point.	out in accordance with debundling check procedure described in section A 4.4.1 *(iii)* of the PoA DD on the SSC CPA seeking inclusion

Define the SSC-CPA Project Scenario Type and business modality

For Project Scenario Type 1 SSC CPAs

ESCO modality

<<name of SSC CPA Implementer >>undertakes the investment in a cogeneration system in a building that has yet to be built and incurs in the ongoing cost of operating it. << SSC CPA implementer name>><< sells electricity and<< chilled water /heat in the form of hot water and/or steam to the site's consumers (describe which of the two services is to be provided and delete the other one)>>. << SSC CPA implementer name >>has the option to choose whether to make such an investment or not.

Hence, as described in section E.5.1 of the PoA DD a Benchmark Approach is appropriate under such circumstances.

For Project Scenario Type 2 SSC CPAs

ESCO modality

<<name of SSC CPA Implementer >>undertakes the investment as an ESCO to introduce a cogeneration system >>in an existing building and incurs in the ongoing cost of operating it. << SSC CPA implementer name>><< sells electricity, chilled water and/or heat in the form of hot water and/or steam to the site's existing consumers (describe services provided and delete the rest)(>>. << SSC CPA implementer name >>has the option, as any ESCO would, to choose whether to take on the associated risks and make such an investment or not.

Hence, as described in section E.5.1 of the PoA DD a Benchmark Approach is appropriate under such circumstances.

Choice of and Calculation of financial indicator:

Additionality for the proposed SSC-CPA has been chosen to be demonstrated by calculating the project IRR, on a Pre Tax basis, and by showing first that the resulting IRR is below the benchmark, and that hence the proposed SSC-CPA is not a financially attractive option, and second, that variations in the values of key parameters that impact the project IRR that would lead to the IRR reaching benchmark are unlikely to materialise.

<<Table B.5.2 provides the project data and information used to the calculate the Project IRR on a Pre tax basis>>.

Table B.5.2. Parameters for project Pre tax IRR

PROJECT DATA		
	Unit	**Comments/Examples of Sources**
Technical lifetime	<<Year>>	<<Estimation of technical lifetime based on information provided by technology providers or the Chartered Institution of Building Services Engineers >>
Investment decision date	<<DD/MM/YYYY>>	<<Can be sourced from board decision, loan agreement or main equipment purchasing contract>>
Construction start date	<<Year>>	<<Can be sourced from constructor quotation, Feasibility Study, Project Status Report or civil work contract>>
Date project starts operating	<<Year>>	<<Can be sourced from scheduled Commissioning date>>
FINANCIAL PARAMETERS		
	Unit	**Comments/Examples of sources**
Total amount of electricity sold	kWh/y	<<Can be sourced from the project developer or Feasibility Study>>
Total amount of cooling sold	kWh/y	<<Can be sourced from the project developer or Feasibility Study>>
Total amount of heat sold	kWhy	<<Can be sourced from the project developer or Feasibility Study>>
Electricity tariff	Local Currency unit /kWh	<<As per contract with electricity buyer when available or the rate that would have had to be paid for sourcing power from the grid.
Cooling Tariff	Local currency unit/kWh	<<Cooling supply agreement between the supplier and the offtaker>>
Heat Tariff	Local currency unit/kWh	<<Heat supply agreement between the supplier and the offtaker>>
Fuel price	Local currency unit/kWh	<<Can be sourced from Fuel supplier, supply contracts>>
Water rate	Local Currency/m3	<<Water utility, supply contracts>>
Inflation rate	% per year	<<If not otherwise specified, annual change in consumer price index at date of investment decision is used. It can be sourced from the Central Bureau statistic or any relevant evidences>>
Exchange Rate	SAR/USD	<<FOREX, Host Country Central Bank's or other relevant websites or sources>>
COSTS AND EQUIPMENT		
	Unit	**Comments/Source**
Total investments	USD	<<If the construction is expected to take place over several years, a yearly breakdown of investments can be provided. The value can be sourced from the project developer design or feasibility study >>
Annual Operation & Maintenance cost	USD/year	<< For a new plant it can be sourced from FE, Feasibility Studies or technology providers; for an existing plant it is sourced from maintenance contract invoices and energy invoices >>
(Other operating expenditure)	USD/year	<<>>
Insurance	% of Capex p.a.	<<Can be sourced from. insurance quotation/contract>>

Applying the above data to the IRR model yields a **Pre Tax Project IRR** equal to<<>>%

Calculation of Benchmark

The Benchmark is calculated according to the approach described in the PoA and model provided. Parameters used to determine the WACC on a Pre Tax basis are provided in table B.5.3 below

Table B.5.3. Parameters for WACC calculation

Parameters	Description	Explanation and source	Reference
RFR	Risk Free Rate in a mature equity market	U.S long-term government bond is considered as risk free instrument. Bond rate is taken as the 6 month average prior to the investment decision and for a duration similar to the technical lifetime of the project activity Source: e.g. http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldYear&year=2010	<<>>
ß *unlevered*	Beta (unlevered)	Total Beta (*Unlevered*) from Damadoran (Stern University) for the relevant sector; most recent year data before the investment decision was made. It reflects a firm's total exposure to risk rather than just the market risk component. It is a function of the market beta and the portion of the total risk that is market risk. These betas might provide better estimates of costs of equity for undiversified owners of businesses. Source: eg. http://pages.stern.nyu.edu/~adamodar/ “Total Beta by industry sector”	<<>>
RP	Total Risk Premium	The Total Risk Premium includes an Equity Risk Premium and a Country Risk Premium. The reason behind this premium stems from the risk-return trade off, in which a higher rate of return is required to entice investors to take on riskier investments. Source: eg:http://pages.stern.nyu.edu/~adamodar/ "Risk Premium for other Markets"	<<>>
SP	Size Premium.	Size premium is an investor’s risk incurred when investing in a small project. Betas are generally calculated based on data for large corporations. However companies of different sizes face different levels of risk. The smaller the company the fewer the sources of capital and investors require additional	

		returns to compensate for the lower marketability of shares. According to Ibbotson Associates' statistics for 2009 [24]for the New York Stock exchange reveals that risk premium increases as the size of a company reduces: The equity risk premium of the largest 10% of companies is -0.36% (i.e. the firms in the largest 10% have an equity risk premium that is 0.36% below average). The smallest 10% of companies (up to 128 million USD) have arisk premium of 5.81% in excess of that determined by the CAPM. The usual way of accounting for this risk premium is to add this to the Cost of Equity (CE), as given in the equation for CE above. The PP may be apply the SP in cases where project CAPEX is less than 100 million USD Source. The Size risk premium can be sourced from the "*Ibbotson SBBI valuation yearbook"* published by Morningstar Inc	
CD	Cost of Debt	As per EB61 Annex 13, Para 16.) If the WACC is based on parameters that are standard in the market, the cost of debt can be taken as the cost of financing in the capital markets, eg the host country commercial lending rate. The yield of a 10 year bond issued by the government of the Host country, if this is not available, the bond with the maturity which is closest to 10 years can also be used. The value of cost of debt can sourced from the Host Country Central Bank e.g or any other relevant evidences. The choice and source shall be clearly indicated in the CPA- DD and shall reflect the cost of debt at the time of the investment decision taking	
%Debt	% of finance from debt	Based on the finance structure of the project. If debt/equity finance structure is not yet available, 50% debt may be assumed As per EB 62, Annex 5, Para 17, 18	<<>>%
%Equity	% of finance from equity	Based on the finance structure of the project. If debt/equity finance structure is not yet available, 50% equity may be assumed As	<<>>%

[24] Ibbotson SBBI 2009 Valuation Yearbook, Chapter 7, page 96

		per EB 62, Annex 5, Para 17, 18	
D/E	Debt to Equity ratio	Calculation	<<>>
T	Tax rate	Host Country Tax regulation	<<>> %
Date of performing financial analysis	09/2011	Can be sourced from the date of the investment decision	

Applying the above data to the Benchmark calculation model results in a <<**Pre/Post Tax>> WACC** equal to**:** <<>>%

Investment analysis

As the above results show the Project Pre tax based IRR is less than the applied benchmark, therefore the proposed SSC CPA is not a financially attractive option for the investor to pursue.

<u>Sensitivity analysis</u>

As specified in the excel spreadsheet to be supplied to the DOE upon submission of a CPA DD, a sensitivity analysis has been conducted on variables that constitute more than 20% of either the total project costs or the total project revenues, and shall include the following variables: (1) total investment; (2) O&M, (3) Revenues (Electricity/Cooling/Heat energy sales) as described in the PoADD.

Table B.5.4 : Framework for reporting results of sensitivity analysis

Factor	**Variation**		
	-10% (or less if appropriate)	0%	10% (or more if appropriate)
Total investment	<<>> %	<<>> %	<<>>
O&M Cost	<<>> %	<<>> %	--
Revenues	<<>> %	<<>> %	<<>> %
Benchmark (WACC Pretax)	<<>>%		

The Project Pre Tax based IRR remains below the Benchmark under the scenarios considered. Hence, the proposed SSC-CPA is not a financially attractive investment for ESDM to pursue and the project is thus deemed to be additional.

For Project Scenario Type 1 SSC CPAs

Engineering, Procurement and Construction Modality

<<name of SSC CPA Implementer >>undertakes the investment in a cogeneration system in <<a building that has yet to be built >> . << SSC CPA implementer name >>has to incur in an investment anyhow to fit the building with the necessary facilities to meet the building’s energy needs.

For Project Scenario Type 2 SSC CPAs

Engineering, Procurement and Construction Modality

<<name of SSC CPA Implementer >> introduces a cogeneration system in an existing building. << SSC CPA implementer name >> is the << owner/entity (select as appropriate) >> responsible for keeping the existing system in proper operating condition and making sure the energy needs of existing consumers are met. In other words <<>> has to either continue to incur in expenditure to keep the existing systems running or has to investment in new equipment to replace these.

Choice of and Calculation of financial indicator:

As described in section E.5.1 of the PoA DD an Investment Comparison Analysis is to be carried out. The Net Present Value of the costs is the applicable financial indicator and is determined using the information and data provided in table B.5.5. below.

Table B.5.5 Parameters for project Pre tax NPV of Costs

PROJECT DATA		
	Unit	**Comments/Source**
Technical lifetime	<<Year>>	<<Estimation of technical lifetime based on information provided by technology providers or the Chartered Institution of Building Services Engineers >>
Investment decision date	<<DD/MM/YYYY>>	<<Can be sourced from board decision, loan agreement or main equipment purchasing contract>>
Construction start date	<<Year>>	<<Can be sourced from constructor quotation, Feasibility Study, Project Status Report or civil work contract>>
Date project starts operating	<<Year>>	<<Can be sourced from scheduled Commissioning date>>
FINANCIAL PARAMETERS		
	Unit	**Comments/Source**
Total amount of electricity sold	kWh/y	<<Can be sourced from the project developer or Feasibility Study>>
Total amount of cooling sold (delete this entire row if cooling is not produced)	kWh/y	<<Can be sourced from the project developer or Feasibility Study>>
Total amount of heat sold (delete this entire row if heat is not produced)	kWhy	<<Can be sourced from the project developer or Feasibility Study>>
Electricity tariff	Local currency unit t/kWh	<<As per contract with electricity buyer when available or the rate that would have had to be paid for sourcing power from the grid.
Cooling Tariff	Local currency unit/kWh	<<Cooling supply agreement between the supplier and the offtaker>>
Heat Tariff	Local currency unit/kWh	<<Heat supply agreement between the supplier and the offtaker>>
Fuel price	Local currency unit/kWh	<<Can be source from Fuel supplier, supply contracts, invoices >>
Water rate	Local Currency/m3	<<Water utility, supply contracts, invoices>>
Inflation rate	% per year	<<If not otherwise specified, annual change in consumer price index at date of investment decision is used. It can be sourced from the Central Bureau statistic or any relevant evidences>>
Exchange Rate	Local currency unit/USD	<< FOREX, Host Country Central Bank's or other relevant websites or sources >>
COSTS AND EQUIPMENT		
	Unit	**Comments/Source**
Total investments	USD	<<If the construction is expected to take place over several

		years, a yearly breakdown of investments can be provided. The value can be sourced from the project developer design or feasibility study >>
Annual Operation & Maintenance cost	USD/year	<< For a new plant it can be sourced from FE, Feasibility Studies or technology providers; for an existing plant it is sourced from maintenance contract invoices and energy invoices >>
(Other operating expenditure)	USD/year	<<>>
Insurance	% of Capex p.a.	<<Can be sourced from insurance quotation/contract>>

Discount rate determination

The discount rate applied is the rate of return that the SSC-CPA implementer expects to obtain from the investment. The selection of the discount rate therefore shall reflect the sector in which the investment is made in and shall be clearly indicated in the CPA DD. It shall be noted that some of the buildings in which the Cogeneration system may be installed under the PoA may be owned by Public entities. Hence it is not appropriate to apply a private sector discount rate nor financial parameters to investments that are made by a public sector entity.

Suitable Discount rates to be applied are indicated in the following table

Table B.5.6 Discount factor considerations for NPV cost calculation<<delete SSC CPA implementer type that doesn't apply>>

SSC CPA Implementers	Discount rate type that may be applied	Sources of information upon which to determine the value to be applied
Private sector entities	WACC	<<As per WACC calculation for ESCO or third party investor modality if WACC is the chosen Discount Rate>>
Government / State owned entity	Government Bond Rate or Govt./official approved discount	<< provide if the SSC CPA implementer is a Public owned entity. >>

Applying the above date to the NPV cost calculations shows that the Net Present Value of the total costs associated with operating the existing system,<< provide NPV cost value of existing system>>, is less than that the of the proposed SSC CPA of << provide the NPV Cost of proposed SSC CPA>>.

<u>Sensitivity analysis</u>

As specified in the excel spreadsheet to be supplied to the DOE upon submission of a CPA DD, a sensitivity analysis has been conducted on variables that constitute more than 20% of either the total project costs or the total project revenues, and shall include the following variables: (1) total investment for the proposed SSC CPA ; (2) O&M Costs for both the SSC CPA and the existing system, (3) Energy costs associated with the ongoing operation of the existing system and those which would be incurred in under the proposed SSC CPA.

Table B.5.7: Framework for reporting results of sensitivity analysis

Factor	**Variation**	
	Existing System +10% (or more if	Proposed SSC CPA -10% (or less if

	appropriate)	appropriate)
Total investment	--	<<>>%
O&M Cost	<<>> %	<<>> %
Energy costs	<<>> %	<<>> %

The NPV of the total costs of the proposed SSC CPA remains higher than those of the existing system. Hence, the proposed SSC CPA is not a financially attractive investment for the << SSC CPA Implementer name>>to pursue and the project is thus deemed to be additional.

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

B.6.1. Explanation of methodological choices

>> The emissions reductions achieved by each CPA are calculated according to the approved methodology AMS II.K. Version 02.0, Scope 03, EB 54 "*Installation of cogeneration or trigeneration systems supplying energy to commercial buildings"*. The emission reductions will be measured as differences between the baseline emissions and sum of the project emission and leakage.

Project emissions

d) Emissions from physical leakage of refrigerant, with a GWP than zero shall be considered in cases in which high efficiency chillers are installed either as integral part of a cogeneration system or in case of a new facility where such chillers are used as back up. The Quantity of refrigerant used in year y to replace that which has leaked can be determined by any of the two Options provided in AMS II.k Version 02.0.

e) Fossil fuels are used to run a cogeneration system's power plant and may be used at times to supplement the waste heat that is used to produce hot water or steam. Project emissions due to fossil fuel combustion are calculated as given in the "Tool to calculate project or leakage CO_2 emissions from fossil Fuel Combustion" EB 41 Annex 11. The CO_2 emissions coefficient is calculated based on Option B of the referred tool.

f) Electricity may have to be imported from the grid into the Cogeneration system at certain times, eg. during start up or even normal operation, to run auxiliary or critical plant equipment that is not fed off the cogeneration power plant, or to compensate for the system's power plant not being able to cover the building's demand due to partial loss of performance, due to planned or unforeseen outages of certain sections of the cogeneration system's power plant, etc. Project emissions associated with the use of electricity that is consumed by components of the cogeneration system under circumstances such as these, but which is not generated by cogeneration system's own power plant shall be determined in accordance with the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption".

   Hence *"Scenario A: Electricity consumption from the grid"* is the applicable scenario.

   The calculation of the Project Emissions resulting from the electricity consumed from the grid by a SSC CPA in year *y* requires that the approach chosen to establish the Emissions Factor of this electricity be defined:

   The option chosen to determine the emissions factor to be applied is *"Option A1":*

"calculate the combined margin emissions factor of the applicable electricity system, using the procedures in the latest approved version of the "Tool to calculate the emissions factor for an electricity system" .

It also requires that the Average Technical Transmission and Distribution losses for providing electricity to the sources *j* in the cogeneration system that may consume such electricity be defined as well:

The Average Technical Transmission and Distribution losses for providing electricity to a source of consumption *j* in year *y*, $TDL_{j,y}$ are assumed to be 3%, in accordance with the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" Annex 7 (Version 01)" whereby for Scenario A, a 3% default value may be applied if the electricity consumption by all project electricity consumption sources to which scenario A applies is smaller than the electricity consumption of all baseline electricity consumption sources to which scenario A applies. This is the case in all cogeneration projects since the electricity needs of the project activity are met by far from cogeneration power plant, and only occasionally, are such power requirements partly met by electricity drawn from the grid.

Leakage:

There are several potential sources of leakage that may be have to be considered for either or both of the Project Scenario Types that can be pursued under the proposed PoA:

Leakage due the installation of energy generation equipment which is transferred from another activity or leakage due to the transfer of the existing energy generation equipment to another activity.

Project Scenario Type 1 SSC CPAs.

Leakage due to the installation of energy generation equipment which is transferred from another activity is considered to be zero in Project Scenario Type 1 SSC CPAs, since only new equipment is used in SSC CPAs that seek to install a cogeneration system in buildings that are yet to be built. Leakage due to the transfer of existing energy generation equipment to another location is not relevant this Project Scenario type since no generation equipment exists at site where the proposed SSC CPA is to be built.

Project Scenario Type 2 SSC CPAs.

Leakage due to the installation of energy generation equipment which is transferred from another activity is considered to be zero in Project Scenario Type 2 SSC CPAs, since only new equipment is used in SSC CPAs that seek to install a cogeneration system in buildings that are yet to be built. Leakage due to the transfer of existing energy generation equipment to another location is considered cero because such equipment shall be scrapped.

The choice of equations to apply to determine the baseline emissions shall be described in the SSC CPA DD taking into account the characteristics of the project and baseline scenarios.

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

Data / Parameter	$TDL_{j,y}$
Unit	--
Description	Average technical transmission and distribution losses for providing electricity to (project consumption) source *j* in year *y*
Source of data	"Tool to calculate baseline, project and/or leakage emissions for electricity consumption" (version 01)"
Value(s) applied	Default value of 3%
Choice of data or Measurement methods and procedures	Project emissions are to be calculated for the electricity that may be occasionally be drawn from the grid (Scenario A of the referred tool) and used by the cogeneration system to run parts of it or serve as backup (project consumption sources *j*) if for whatever reason the electrical demands cannot be met by the cogeneration system's power plant. The 3% default value is applied since the Electricity consumption by all project electricity consumption sources in the cogeneration system is much smaller than the electricity consumed by all the baseline consumption sources. One of the key objectives of the cogeneration system is the production of power, i.e. not to import power from the grid.
Purpose of data	Used to estimate project emissions
Additional comment	

Data / Parameter	$SFC_{cp,i}$
Unit	Quantity of fuel in thermal, mass or volume unit/MWh)
Description	Specific fuel consumption rate of the captive power plant
Source of data	<<>>
Value(s) applied	<<>>
Choice of data or Measurement methods and procedures	(a) For project activities displacing electricity previously obtained from the operation of existing captive power plants, the specific fuel consumption rate should be established based on historical performance data from the last three years. If historical data is insufficient or unreliable manufacturer's lowest quoted value for the plant shall be applied as a conservative alternative
Purpose of data	Used to estimate baseline emissions
Additional comment	Only applicable for Project Scenario Type 2 SSC CPAs in which the electricity would have been generated using captive power plants. If not applicable, please delete.

Data / Parameter	$COEF_{i,j}$
Unit	tCO_2/mass or volume unit
Description	CO_2 emission coefficient of fuel type i in year y

<table>
<tr><td>Source of data</td><td>The following data sources may be used if the relevant conditions apply
<table>
<tr><th>Data Source</th><th>Conditions for using the data source</th></tr>
<tr><td>a) Values provided by the fuel suppliers in invoices</td><td>This is the preferred source if the carbon fraction of the fuel is not provided (Option A)</td></tr>
<tr><td>b) Measurements by the project participants</td><td>If a) is not available</td></tr>
<tr><td>c) Regional or national default values</td><td>If a) is not available</td></tr>
<tr><td>d) IPCC default values at the upper 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>If (a) is not available</td></tr>
</table></td></tr>
<tr><td>Value(s) applied</td><td><<>></td></tr>
<tr><td>Choice of data
or
Measurement methods and procedures</td><td><< >>

For a) and b): Measurements should be undertaken in line with national or international fuel standards

For a) and b): If the fuel supplier does provide the NCV value and the CO_2 emissions factor on the invoice and these two values are based on measurements for this specific fuel, the CO_2 factor should be used. If another source for the e CO_2 missions factor is used or no CO_2 emissions factor is provided, options b), c) or d) should be used</td></tr>
<tr><td>Purpose of data</td><td>Used to estimate baseline emissions</td></tr>
<tr><td>Additional comment</td><td></td></tr>
</table>

Data / Parameter	$E_{capt,hist,i}$
Unit	MWh
Description	Electricity consumed from the captive power plant, i (historical, i.e. three most recent years)
Source of data	Metered electricity consumption figures and invoices
Value(s) applied	To be described in the corresponding SSC CPA DD
Choice of data or Measurement methods and procedures	The metered values of electricity supplied from captive power plants shall be crosschecked against invoices for the same period in cases where the such invoices exist (i.e. third party supplies the power). In cases where the captive power is run by the owner of the site where the CPA is to be implemented, the metered quantities of electricity generated shall be cross checked against fuel bills for the same period and multiplying the total fuel consumed by the specific fuel consumption of the captive power plant, ie $SFC_{cp,i}$. If the emissions factor of the captive power plant is higher than that of the grid, the lower between the metered and crosschecking sources of electricity consumption figures shall be taken. Conversely, if the emissions factor for the captive power plant is lower than that of the grid, the higher between the two electricity consumption values shall be used to ensure conservativeness in the determination of the weighted average emission factor (EF electricity) in accordance with AMS II.K/Version 02.0.
Purpose of data	Used to estimate baseline emissions
Additional comment	Applicable in cases where the electricity that is displaced would have been provided by a combination of captive power plants and the grid.

Data / Parameter	$E_{grid,hist}$
Unit	MWh
Description	Electricity consumed from the grid (historical, i.e. for each of three most recent years)
Source of data	Metered electricity consumption figures and invoices
Value(s) applied	To be described in the corresponding SSC CPA DD
Choice of data or Measurement methods and procedures	The metered values of electricity consumed shall be cross checked against electricity invoices for the same period. If the emissions factor of the captive power plant that also supplies electricity is higher than that of the grid, the largest between the two values of electricity consumption figures shall be taken to be the electricity consumed from the grid. Conversely, if the emissions factor of the captive power plant is less than that of the grid the lower between the two values of energy consumed from the grid values shall be taken to ensure conservativeness in the determination of the weighted average emission factor (EF electricity) in accordance with AMS II.K/Version 02.0
Purpose of data	Used to estimate baseline emissions
Additional comment	Applicable in cases where the electricity that is displaced would have been provided by a combination of captive power plants and the grid.

Data / Parameter	$COP_{c,i}$
Unit	--
Description	The Coefficient of Performance of the baseline scenario chiller(s) *i* (MWh_{th}/MWh_e). The Coefficient of Performance is defined as 'cooling output divided by electricity input'
Source of data	For Project Scenario Type 1 SSC CPAs source shall be the COP specified for the baseline reference plant, and taken as the highest COP full load performance value provided by two or more manufacturers for chillers commonly sold in the project country For Project Scenario Type 2 source shall be either the baseline cooling plant or if the baseline is determined to be the baseline reference plant COP shall be:<< input value given in PoA >>
Value(s) applied	<<>>
Choice of data or Measurement methods and procedures	[Choose as applicable and delete the other text:] For Project Scenario Type 1 SSC CPAs. AMS II k requirement. For Project Scenario Type 2 SSC CPAs where the baseline scenario is the operation of an existing chiller or chillers, then the COP shall be based on existing chiller performance data from last three years, immediately preceding the start of the project activity. In the case where multiple chillers exist, average performance data shall be used in a conservative manner with consideration of the historic output and power consumption of each chiller.
Purpose of data	Used to estimate baseline emissions
Additional comment	As indicated in the PoA DD. .(delete table if waste heat from the cogeneration plant is only used to meet heat loads)

Data / Parameter	C_{pw}
Unit	MJ/tonnes °C
Description	Specific heat capacity of water
Source of data	AMS II.K/ Version 02.0
Value(s) applied	4.2 MJ/t °C
Choice of data or Measurement methods and procedures	As per AMS II.K / Version 02.0
Purpose of data	Used to estimate baseline emissions
Additional comment	

Data / Parameter	η_{cs}
Unit	
Description	Efficiency of the displaced steam generation system(s) in year *y*
Source of data	<<>>
Value(s) applied	<<>>
Choice of data or Measurement methods and procedures	Project Scenario Type 1 SSC CPAs: As per para 22 (a) (i) of AMS II.K. Version 02.0, If the baseline scenario is a steam generator or generators that would have been built (i.e., not existing steam generators), the efficiency shall be determined per the "Tool to determine the baseline efficiency of thermal or electric energy generation systems"; Project Scenario Type 2 SSC CPAs: As per para 22 (b) (ii) of AMS II.K Version 02.0, If the baseline scenario is an existing fossil fired steam generator or generators, then the efficiency shall be based on existing steam generator performance data from last three years, immediately preceding the start of the project activity. In the case where multiple steam generators exist, average performance data shall be used in a conservative manner with consideration of the historic output and power consumption of each steam generator.
Purpose of data	Used to estimate baseline emissions
Additional comment	Where performance data of existing boilers is not available or unreliable, design efficiency values for the existing boiler models may be taken as a conservative alternative. .(delete table if waste heat from the cogeneration plant is only used to meet cooling loads)

Data / Parameter	$GWP_{ref, PJ}$
Unit	tCO_{2e}/t refrigerant
Description	Global Warming Potential of the refrigerant used in new cooling equipment
Source of data	If the refrigerant used is listed in Annex A of the Protocol, then values listed in IPCC's second assessment report shall be used, else values listed in the IPCC's third assessment report shall be used.
Value(s) applied	<<>>
Choice of data or Measurement methods and procedures	<<>>
Purpose of data	Used to estimate project emissions
Additional comment	(delete table if waste heat from the cogeneration plant is only used to meet heat loads)

Data / Parameter	GWP_{ref}
Unit	tCO_2e/t refrigerant
Description	Global Warming Potential of the refrigerant used in the baseline chillers
Source of data	If the refrigerant used is listed in Annex A of the Protocol, then values listed in IPCC's second assessment report shall be used, else values listed in the IPCC's third assessment report shall be used.
Value(s) applied	<<>>
Choice of data or Measurement methods and procedures	<<>>
Purpose of data	Used to estimate leakage
Additional comment	The GWP_{ref} may differ from $GWP_{ref,PJ}$ which refers to the non ODP refrigerant that might be used in new cooling equipment. .(delete table if waste heat from the cogeneration plant is only used to meet heat loads)

<table>
<tr><td>Data / Parameter</td><td>$NCV_{i,y}$</td></tr>
<tr><td>Unit</td><td>GJ per mass or volume unit (e.g. GJ/m^3, GJ/ton)</td></tr>
<tr><td>Description</td><td>Weighted average net calorific value of fuel type 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 suppliers in invoices</td><td>This is the preferred source if the carbon fraction of the fuel is not provided (Option A)</td></tr>
<tr><td>Measurements by the project participants</td><td>If a) is not available</td></tr>
<tr><td>Regional or national default values</td><td>If a) is not available</td></tr>
<tr><td>IPCC default values at the upper 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>If (a) is not available</td></tr>
</table></td></tr>
<tr><td>Value(s) applied</td><td><<>></td></tr>
<tr><td>Choice of data or Measurement methods and procedures</td><td><< >>
For a) and b): Measurements should be undertaken in line with national or international fuel standards

For a) and b): The NCV should be obtained for each fuel delivery, from which weighted average annual values should be calculated
For c): Review appropriateness of the values annually
For d): Any future revision of the IPCC Guidelines should be taken into account</td></tr>
<tr><td>Purpose of data</td><td>Used to estimate baseline and project emissions</td></tr>
<tr><td>Additional comment</td><td></td></tr>
</table>

<table>
<tr><td>Data / Parameter</td><td>$EF_{CO2,i,y}$</td></tr>
<tr><td>Unit</td><td>t CO_2/GJ</td></tr>
<tr><td>Description</td><td>Weighted average CO_2 emissions factor for fuel type in year y</td></tr>
<tr><td>Source of data</td><td>
<table>
<tr><td>Data Source</td><td>Conditions for using the data source</td></tr>
<tr><td>Values provided by the fuel suppliers in invoices</td><td>This is the preferred source</td></tr>
<tr><td>Measurements by the project participants</td><td>If a) is not available</td></tr>
<tr><td>Regional or national default values</td><td>If a) is not available

These sources can only be used on well documented, reliable sources (such as national energy balances)</td></tr>
<tr><td>IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol, 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories</td><td>If (a) is not available</td></tr>
</table>
</td></tr>
<tr><td>Value(s) applied</td><td><<>></td></tr>
<tr><td>Choice of data or Measurement methods and procedures</td><td>For a) and b): The NCV should be obtained for each fuel delivery, from which weighted average annual values should be calculated
For c): Review appropriateness of the values annually
For d): Any future revision of the IPCC Guidelines should be taken into account</td></tr>
<tr><td>Purpose of data</td><td>Used to estimate baseline and project emissions</td></tr>
<tr><td>Additional comment</td><td>For a) and b): Measurements should be undertaken in line with national or international fuel standards</td></tr>
</table>

Data / Parameter	$EF_{grid,y}$
Unit	t CO_2e/MWh
Description	CO_2 emission factor for the grid electricity displaced in year y in the relevant host country
Source of data	<<For the Kingdom of Saudi Arabia DNA athttp://www.cdmdna.gov.sa/news/11-12-11/Baseline_Determination_for_the_Electricity_Grid_in_Saudi_Arabia.aspx>>
Value(s) applied	<< calculated as per provisions of AM S-I.D and describe calculation in Annex 3 of the SSC CPA DD and present value calculated here>>
Choice of data or Measurement methods and procedures	Grid emission factor shall be as per provisions of AMS-I.D.
Purpose of data	Used to estimate baseline and project emissions
Additional comment	<<Value is to be applied exante and to remain fixed during the first crediting period of the SSC CPA>>

Data / Parameter	$Q_{ref,start,i}$
Unit	t refrigerant
Description	Quantity of refrigerant (charge) contained in chiller i assumed to be present at the start of the SSC CPA crediting period, t Refrigerant
Source of data	Baseline chiller information
Value(s) applied	To be described in the SSC CPA DD
Choice of data or Measurement methods and procedures	<< >>
Purpose of data	Used to estimate leakage
Additional comment	To be applied only to Project Scenario Type 2 SSC CPAs. To be applied only once to determine Leakage Emissions associated with the displacement of GWP refrigerant containing baseline chillers, which are *assumed*, for conservative reasons to not having been destroyed and thus escape to atmosphere during the 1st year of the crediting period. It differs from $Q_{ref,PJ,start}$ which refers to the refrigerant charge in new equipment at the start of their operation.(delete table if waste heat from the cogeneration plant is only used to meet heat loads)

Data / Parameter	GWP_{CH4}
Unit	tCO_2e/tCH_4
Description	Global warming potential of methane valid for the relevant commitment period
Source of data	IPCC
Value(s) applied	Default value for the first commitment period = 21 tCO_2e/tCH_4
Choice of data or Measurement methods and procedures	IPCC
Purpose of data	Used to estimate leakage
Additional comment	

B.6.3. Ex-ante calculations of emission reductions

>> The SSC-CPA is a Cogeneration system that involves:

- Supplying Electricity from <<technology used to supply power in proposed SSC CPA>>
- <<Supplying Cooling (chilled water) <<technology used to supply chilled water in proposed SSC CPA>> (delete if the cogeneration system does not use waste heat to produce cooling)>>
- <<Supplying <<Hot water/Steam (delete as appropriate)>> (delete if the cogeneration system does not use waste heat to meet heat loads)>>

The equations, data and parameters given in section E.6.2 of the PoA that are applicable to the proposed SSC-CPA for the purpose of determining the baseline, project and leakage emissions are as follows:

A. Calculation of baseline emissions

The baseline emissions, BE_y, are calculated using equation (1):

$$BE_y = BE_{grid,y} + BE_{capt,y} + BE_{BC,y} + BE_{BH,y} \quad \textbf{(1)}$$

Where:

$BE_{grid,y}$	Baseline emissions associated with the grid electricity displaced by the project in year *y* (t CO_2e/year)
$BE_{capt,y}$	Baseline emissions associated with the electricity produced by a captive power plant in year *y* (tCO_2e/year)
$BE_{BC,y}$	Baseline emissions associated with the cooling (e.g., chilled water) produced in year *y* (tCO_2e/year)
$BE_{BH,y}$	Baseline emissions associated with the heat (e.g., steam or hot water) produced in year *y* (tCO_2e/year)

<< select which of the following calculations to determine the baseline emissions associated to the electricity that is produced by the proposed SSC-CPA is applicable. Delete the remaining equations and corresponding text>>

A.1 Baseline emissions associated with the grid electricity displaced by the project in year *y*

The emissions associated with the electricity that the SSC CPA displaces which would have been sourced from the grid to meet electrical load other than those imposed by the chilled water system are::

(b) If the SSC CPA displaces electricity that was previously obtained from the grid or would have been obtained from the grid, the baseline emissions include the CO_2 emissions of the power plants connected to the grid. The baseline emissions ($BE_{grid,y}$) $BE_{P,y}$)are calculated based on the amount of grid electricity displaced by the SSC CPA times are calculated based on the amount of grid electricity displaced by the SSC CPA times the emission factor of the grid calculated, as indicated in equation (2) in accordance with methodology AMS-I.D.

$$BE_{grid,y} = E_{grid,y} * EF_{grid,y} \quad \textbf{(2)}$$

$BE_{grid,y}$	Baseline emissions for the grid electricity displaced by the project in year *y* (tCO_2e/year)
$E_{grid,y}$	Amount of grid electricity displaced by project in year *y* (MWh)
$EF_{grid,y}$	Emission factor of the grid (calculated in accordance with methodology AMS-I.D (tCO_2e/MWh)

= <<>>MWh/yr *<<>> tCO_2/MWh

= <<>> tCO_2 /yr

A.2 Baseline emissions associated with the electricity produced by a captive power plant in year *y*

If the SSC CPA displaces electricity that was previously obtained from captive power plant(s), the baseline emissions ($BE_{capt,y}$) include the CO_2 emissions calculated based on the amount of captive power plant electricity displaced by the project activity times the emission factor of the captive power plant(s) calculated, as indicated in equation (3). As above, the electricity that is displaced is electricity that would have been used to meet electrical loads other than those resulting from the operation of the baseline chillers.

$$BE_{capt,y} = \sum_i E_{capt,i,y} * EF_{capt,i} \quad \textbf{(3)}$$

Where:

$BE_{capt,y}$	Baseline emissions for the amount of electricity displaced by the captive power plants in year *y* (tCO_2e/year)
$E_{capt,y,i}$	Amount of electricity displaced by project in year *y* (MWh_e) from captive power plant *i*
$EF_{capt,i}$	Emission factor of the captive power plant *i* (tCO_2/MWh_e)

The emission factor of each captive power plant is calculated based on the specific fuel consumption rate[25] (quantity of fuel in thermal, mass or volume unit per unit electrical output) of the captive power plant ($SFC_{cp,i}$ SFC_x) determined as follows:

(d) For project activities displacing electricity previously obtained from the operation of existing captive power plants, the specific fuel consumption rate should be established based on historical performance data from the last three years;

(e) For project activities displacing electricity from a captive power plant that otherwise would have been built, the specific fuel consumption rate is obtained from at least two manufacturers of systems of similar specifications and a conservative value shall be used;

(f) The emission factor of each captive power plant is calculated as the product of the emission factor of fuel *j* used by captive power plant *i* ($COEF_{i,j}$ $COEF_i$) times $SFC_{cp,i}$;SFC_x Equations 2, 3, or 4 contained in the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" shall be used for this purpose. See equation below.

$$EF_{capt,i} = \sum_j COEF_{i,j} * SFC_{cp,i} \quad \textbf{(4)}$$

Where:

$EF_{capt,i}$	Emission factor of captive power plant *i* (tCO_2/MWh_e)
$SFC_{cp,i}$	Specific fuel consumption rate of the captive power plant (quantity of fuel in thermal, mass or volume unit/MWh)
$COEF_{i,j}$	CO_2 emission coefficient of fuel type *i* (tCO_2 / quantity of fuel in thermal, mass or volume unit)

= ∑ (<<>>MWh/yr * <<>> tCO_2/MWh),*i*,*y*

= <<>> tCO_2 /yr

A.3 Baseline emissions associated with the grid and captive power plant sourced electricity displaced by the project in year *y*.

In case the project activity displaces electricity from a captive power plant as well as from the grid, then the weighted average emission factor for the displaced electricity is calculated using values based on the relative historical, prior three year ratios of electricity from captive plants and the grid.[26] For new facilities, the most conservative (lowest) emission factor of the two power sources should be used.

The ratios of the quantities of electricity that are obtained from captive power plants and the grid shall be determined by adding the total amount of electricity obtained from each source of electricity on its own over the more recent three years (i.e. $E_{capt,hist,i}$, in the case of electricity obtained from captive

[25] In case in the baseline situation where more than one type of fossil fuel is used in the captive power plant, the relative contribution to the total output of each fossil fuel shall be considered and the formulas for baseline emissions shall be adjusted accordingly.

[26] For example if in the baseline 80% of annual electricity requirement was met by grid import and the remaining by captive generation, the weighted average emission factor ($EF_{electricity}$) would be 0.8 EF_{grid}+ 0.2 $EF_{captive}$.

power plants and $E_{grid,hist}$ in the case of electricity drawn from the grid) and dividing each the resulting two consumption figures by the total (combined) amount of electricity consumed over those same 3 years, i.e. the sum of the electricity drawn from the grid plus that drawn from the captive power plants over that same period.

A.4. Baseline emissions associated with the cooling (e.g., chilled water) produced in year *y* (delete this section if waste heat obtained from the cogeneration isn't used to produce cooling)

The emissions associated with the electricity that would have been used in the absence of a SSC CPA by electrically driven chillers, whether the electricity used to run them is sourced from the grid and/or captive power plants, to produce chilled water within the project boundary are determined per equation below.

$$BE_{BC,y} = EF_{ELEC,y} \times \sum_i \frac{C_{P,i,y}}{COP_{c,i}} \qquad (5)$$

Where:

$BE_{BC,y}$	Baseline emissions for chilled water produced in the project activity in year *y* (tCO_2e/year)
$EF_{ELEC,y}$	Electricity emission factor of the grid, calculated in accordance with methodology AMS-I.D, and/or of the captive plant(s), calculated in accordance with equation 4. (tCO_2e/MWh)
$COP_{c,i}$	The Coefficient of Performance of the baseline scenario chiller(s) *i* (MWh_{th}/MWh_e). The Coefficient of Performance is defined as 'cooling output divided by electricity input'
$C_{P,i,y}$	Cooling output of baseline scenario chiller(s) *i* in year *y*(MWh_{th}/year)

c) Determination of Baseline Scenario Chiller Coeficient of performance

The Baseline scenario chiller Coefficient of Performance is determined as follow, as per AMS II.K Version 02.0:

<<delete which of the following approaches to determine baseline chiller that does not apply >>

For Project Scenario Type 1 SSC CPAs:

If the baseline scenario is determined to be a chiller or chillers that would have been built (i.e., there are no existing chillers in place), the Coefficient of Performance shall be determined as the highest COP full load performance value provided by two or more manufacturers for chillers commonly sold in the project country for the indicated commercial application.

For Project Scenario Type 2 SSC CPAs:

If the baseline scenario is an existing chiller or chillers, then the COP shall be based on existing chiller performance data from last three years, immediately preceding the start of the project activity. In the case where multiple chillers exist, average performance data shall be used in a conservative manner with consideration of the historic output and power consumption of each chiller;

In cases where the baseline emissions are to be determined by assuming that a baseline reference plant would have been built, then the baseline COP shall be determined as the highest COP full load performance value provided by two or more manufacturers for chillers commonly sold in the project country for the indicated commercial application. i.e. the COP of the technology that is assumed would have been used in the Baseline Reference plant to meet a buildings space cooling requirements

d) Determination of Cooling Output of each baseline scenario chiller

The cooling output of each baseline scenario chiller *i* is calculated using measured values of the total chilled water mass flow-rate and of the differential temperature of incoming and outgoing chilled water; as recorded on an hourly basis in year *y* per equation below.

$$C_{p,i,y} = \frac{\sum_{h=1}^{8,760} m_{C,i,h} * C_{\rho w,C} * \Delta T_{C,i,h}}{3600} \quad \textbf{(6)}$$

Where:

$C_{p,i,y}$	Cooling output of the baseline chiller(s) *i* in year *y* (MWh_{th}/year)
$m_{C,i,h}$	The chilled water mass flow-rate for chiller(s) *i* produced by project in hour *h* of year *y* (tonnes/hour)
$C_{\rho w,C}$	The specific heat capacity of water (MJ/tonnes °C) (4.2 MJ/t °C)
$\Delta T_{C,i,h}$	Differential temperature of inlet and outlet chilled water for chiller(s) *i* in hour *h* of year *y* of incoming and outgoing water from project (°C)

= (<<>> tonne/hr x 8760 hr/yr x 4.2 MJ/t °C x <<>>°C)/3600

= <<>>MWh/yr

Therefore, $BE_{BC,y} = EF_{ELEC,y} \times \sum_i \frac{C_{P,i,y}}{COP_{c,i}}$

= <<>> tCO_2e/MWh x∑(<<>>MWh/yr/<<>>)*i*

= <<>>tCO_2 /yr

A.5 Baseline emissions associated with the heat (e.g., steam or hot water) produced in year *y* (delete this section if waste heat from the cogeneration system isn't used to meet heat loads)

A.5.1 Baseline emissions associated with steam production

$$BE_{BH,y} = \sum_i EF_i \times \frac{S_{p,i,y}}{\eta_{cs}} \qquad \textbf{(8)}$$

Where:

$BE_{BH,y}$	Baseline emissions for steam produced in the project activity in year *y*
EF_i	Emission factor of fossil fuel *i*,
η_{cs}	Efficiency of the displaced steam generation system(s) in year *y*
$S_{p,y}$	Thermal energy delivered by the project activity (TJ) in year *y* measured on an hourly basis using mass flow rate and enthalpy data

(b) Select the applicable approach to determining the efficiency of the fossil fuel fired steam generation systems (η_{cs}). << delete the one that is not applicable>>:

Project Scenario Type 1 SSC CPAs

As per para 22 (a) (i) of AMS II.K. Version 02.0, If the baseline scenario is a steam generator or generators that would have been built (i.e., not existing steam generators), the efficiency shall be determined per the “Tool to determine the baseline efficiency of thermal or electric energy generation systems”;

Project Scenario Type 2 SSC CPAs

As per para 22 (b) (ii) of AMS II.K Version 02.0, If the baseline scenario is an existing fossil fired steam generator or generators, then the efficiency shall be based on existing steam generator or performance data from last three years, immediately preceding the start of the project activity. In the case where multiple steam generators, average performance data shall be used in a conservative manner with consideration of the historic output and power consumption of each steam generator

The baseline emissions associated with the combustion of fossil fuels shall be determined as indicated in the “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion”.

A.5.2 Baseline emissions associated with hot water production The baseline emissions associated with the production of hot water are determined using the electricity emission factor and hourly measurements of the total water mass flow-rate and differential temperature of incoming and outgoing water, per equation below.

This equation is based on the assumption that the hot water produced in the absence of the SSC-CPA would have been produced in electric water heating systems operating at100% efficiency.

$$BE_{BH,y} = EF_{ELEC,y} \times \sum_{h=1}^{8,760} \frac{m_h * C_{\rho w} * \Delta T_h}{3600} \qquad \textbf{(7)}$$

Where:

$BE_{BH,y}$	Baseline emissions for hot water produced in the project activity in year *y*
$EF_{ELEC,y}$	Electricity emission factor of the grid (calculated in accordance with methodology AMS-I.D and/or captive plant(s) (calculated in accordance with

equation above) (tCO_2e/MWh)

m_h The water mass flow-rate from heater(s) during hour *h* in year *y* (tonnes/hr)

$C_{\rho w}$ The specific heat capacity of water (MJ/tonnes °C) (4.2 MJ/t °C)

ΔT_h Differential temperature of inlet and outlet hot water for heater(s) during hour *h* (°C)

= <<>> tCO_2e/MWh x (<<>> tonne/hr x 8760 hr/yr x 4.2 MJ/t °C x <<>>°C)/3600

= <<>> tCO_2/yr

Total Baseline Emissions

The total Baseline emissions:

$$BE_y = BE_{grid,y} + BE_{capt,y} + BE_{BC,y} + BE_{BH,y} \quad \textbf{(1)}$$

= <<>> tCO_2 /yr + <<>> tCO_2 /yr+<<>> tCO_2 /yr+ <<>> tCO_2 /yrtCO_2/yr

= <<>>tCO_2 /yr

B. Project activity emissions

Project emissions are equal to a) the emissions associated with consumption of fossil fuel and electricity within the project boundary by the co-generation or tri-generation system, auxiliary equipment, and systems (such as boilers, chiller and hot water heaters, captive electricity generation plants) used to generate any backup or supplemental electricity, heating or cooling and (b) the emissions associated with any refrigerants used in new project cooling equipment (e.g. electrical compression chillers which are an integral part of a co-generation/tri-generation system or in the case of a new facility where electrical compression chillers are used as a backup).

Project emissions for both Project Scenario Types are determined as follows:

$$\mathrm{PE}_y = PE_{ref,y} + PE_{energy,y} \quad \textbf{(9)}$$

Where:

$PE_{ref,y}$ Project emissions from physical leakage of refrigerant, with a GWP greater than zero, from new cooling equipment in year *y*, determined in accordance with paragraph 25 below (tCO_2e/yr)

$PE_{energy,y}$ Project emissions due to consumption of fossil fuel and/or electricity (tCO_2/yr). Equal to:

- Fuel consumption of project including any fuel used to run auxiliary equipment. Emissions are calculate using the “Tool to calculate project

or leakage CO_2 emissions from fossil fuel combustion";

- Electricity consumption of project including any electricity used to run auxiliary equipment is calculated using the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"

B.1 Project emissions from physical leakage of refrigerant (delete if no cooling is produced from waste heat produced in the cogeneration system)

Emissions from physical leakage of refrigerant from new cooling equipment are determined as follows:[27]

For first project year of the first crediting period:

$$PE_{ref,1} = \left(Q_{ref,PJ,start}\right) * GWP_{ref,PJ} \quad \textbf{(10)}$$

For projects years beyond the first year:

$$PE_{ref,y} = \left(Q_{ref,PJ,y}\right) * GWP_{ref,PJ} \quad \textbf{(11)}$$

Where:

$PE_{ref,y}$	Project emissions from physical leakage of refrigerant from new cooling equipment in year *y* (tCO_2e/yr)
$Q_{ref,PJ,start}$	Quantity of refrigerant charge in new cooling equipment at its start of operation (only accounted for in the first year of the first crediting period) (tonnes)
$Q_{ref,PJ,y}$	Quantity of refrigerant used in year *y* to replace refrigerant that has leaked in year *y* (tonnes/year)
$GWP_{ref,PJ}$	Global warming potential of the refrigerant that is used in new cooling equipment (tCO_2e/t refrigerant)

$Q_{ref,PJ,y}$ is determined using one of the following options: << chose the option that is applicable and delete the other one>>

Option A: using the higher of the two quantities below:

(c) The monitored quantity of refrigerant used for top up to compensate for the leaked quantity during the year *y*; or

(d) The typical refrigerant leakage rate for the type of cooling equipment as determined from the Emission Factors (expressed in terms percentage of the initial charge/year) provided in the IPCC 2006 Guidelines, Chapter 7, Table 7.9 "Estimates for charge, lifetime and emissions factors for refrigeration and air conditioning systems".

Option B: use a default value of 35% of the initial refrigerant charge, i.e. $Q_{ref,PJ,y} = 0.35 * Q_{ref,PJ,start}$

27 Baseline emissions related to refrigerant use are assumed to equal zero.

B.2 **Project emissions due to consumption of fossil fuel and/or electricity**

Project emissions due to consumption of fossil fuel and/or electricity (tCO_2/yr) are determined as follows.

$$PE_{energy,y} = PE_{FC,j,y} + PE_{EC,y} \quad (12)$$

$PE_{FC,j,y}$	=	Project emissions from fossil fuel consumption in year *y* , tCO_2/yr
$PE_{EC,y}$	=	Project emissions from electricity consumption in year *y* , tCO_2/yr

B2.1 Project CO_2 emissions from fossil fuel combustion

Fuel consumption of project including any fuel used to run auxiliary equipment. Emissions are calculated using the: "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"; as follows:

CO_2 emissions from fossil fuel combustion in process j are calculated based on the quantity of fuels combusted and the CO_2 emission coefficient of those fuels, based on Option B) as follows:

$$PE_{FC,j,y} = \sum FC_{i,j,y} \times COEF_{i,y} \quad (13)$$

Where: $PE_{FC,j,y}$	=	Are the CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2/yr);
$FC_{i,j,y}$	=	Is the quantity of fuel type i combusted in the <<trigeneration/cogeneration (delete as appropriate)>> system j during the year y (mass or volume unit/yr);
$COEF_{i,y}$	=	Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
i	=	Are the fuel types combusted in process j during the year y

The CO_2 emission coefficient COEFi,y is calculated based on net calorific value and CO_2emission factor of the fuel type i, as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2i,y} \quad (14)$$

Where:

$COEF_{i,y}$	=	Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
$NCV_{i,y}$	=	Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$	=	Is the weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ)
i	=	Are the fuel types combusted in process j during the year y

= <<>> GJ/tonne *<<>>tCO_2/GJ

= <<>>tCO_2 /tonne

Therefore,

$PE_{FC,j,y} = \sum FC_{i,j,y} \text{ x } COEF_{i,y}$

= ∑(<<>> tonnes/yr * <<>>tCO_2 /tonne)*i,y*

= <<>>tCO_2 /yr

B.2.2 Project emissions associated with the consumption of electricity drawn from the grid

CO_2 emissions associated with any electricity drawn from the grid which might have to be used during startup or during partial / full outage of the <<cogeneration/ trigeneration (delete as appropriate) >>facility's power plant calculated using the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption", as follows:

$$PE_{EC,y} = \sum_{j} EC_{PJ,j,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y}) \qquad (15)$$

Where:

$PE_{EC,y}$	=	Project emissions from electricity consumption the year y (tCO_2/yr);
$EC_{PJ,j,y}$	=	Quantity of electricity consumed by the project electricity consumption source *j* in year y (MWh/yr);
$EF_{EL,j,y}$	=	Emissions factor for electricity generation for source j in year *y* (tCO_2/MWh)
$TDL_{j,y}$	=	Average technical transmission and distribution losses for providing electricity to consumption source j in year y (tCO_2/mass or volume unit)
j	=	Sources of electricity consumption in the project

The Emission Factor corresponding to the electricity consumed shall be combined margin emission factor of the applicable electricity system, using the procedures in the latest approved version of the "Tool to calculate the emission factor for an electricity system" ($EF_{EL,j,y} = EF_{grid,\ CM,y}$)

= <<>>0 MWh/y * <<>> tCO_2/MWh * (1+ 0.03)

= <<>>tCO_2 /yr

C. Leakage

Potential Sources of leakage that are applicable to the proposed SSC CPA include << select as appropriate and delete the rest>>

C.1 Leakage due to the installation of energy generation equipment which is transferred from another activity or leakage due to the transfer of the existing energy generation equipment to another activity.

Project Scenario Type 1 SSC CPAs.

Source of leakage can be taken as zero since only new equipment is used in SSC CPAs that seek to install a cogeneration system in buildings that are yet to be built.

Project Scenario Type 2 SSC CPAs.

Source of leakage due to installation of energy generation equipment is considered zero since only new equipment is installed in the cogeneration system.

Leakage due to the transfer of the existing energy generation equipment to another equipment shall be considered cero since any equipment that is removed from the baseline site shall be destroyed.

Any existing energy generation equipment, such as power plant, chiller and hot water heaters and boilers that are to be removed from the baseline site as a result of the SSC CPA shall be destroyed after replacement to ensure that it is not sold and reutilized but taken out of service permanently. The destruction must be witnessed, photographed (still and video), and certified by an independent third party and ensuring that provisions are in place that enable the unique identification of the existing equipment that is to be destroyed.

C.2 Leakage due to the displaced refrigerant not being destroyed (delete this section if no cooling is produced from the waste heat derived from the Cogeneration System)

Project Scenario Type 1 SSC CPAs

Not applicable to SSC CPAs that install cogeneration system in buildings that are yet to be built. No refrigerant is displaced as a result of the SSC CPA.

Project Scenario. Type 2 SSC CPAs:

If the displaced refrigerant is a greenhouse gas as defined in Annex A of the Kyoto Protocol or in paragraph 1 of the Convention and is not destroyed, leakage emission from its storage or usage in another equipment must be considered[28] and deducted from the emission reductions.

It shall be assumed for determining the emissions reductions that any refrigerant present in the existing chillers that are displaced by the proposed SSC CPA which has a GWP is not destroyed. The associated project emissions shall be determined based on the equipment manufacturers quoted refrigerant charge,

[28] The global warming potentials used to calculate the carbon dioxide equivalence of anthropogenic emissions by sources of greenhouse gases not listed in Annex A of the Kyoto Protocol, shall be those accepted by the Intergovernmental Panel on Climate Change in its third assessment report.

refrigerant type and refrigerant GWP. It is assumed that all this gas is released during the first year of the crediting period. Thereafter this term shall be set to zero

$$LE_{ref,start} = \sum Q_{ref,start,i} x GWP_{ref} \quad (16)$$

$LE_{ref,start}$	=	GHG emissions due to the refrigerant charge contained in the baseline chillers that is *assumed* to be released to the atmosphere as a result of the equipment being displaced by SSC CPA during the 1st year of the crediting period.(tCO_2);
$Q_{ref,start,i}$	=	Quantity of refrigerant (charge) contained in chiller i assumed to be present at the start of the SSC CPA crediting period, t Refrigerant
GWP_{ref}	=	Global Warming Potential of the refrigerant (tCO_{2e}/t refrigerant)
i	=	Baseline chiller number

C.3 Leakage resulting from fuel extraction, processing, liquefaction, transportation, re-gasification and distribution of fossil fuels outside of the project boundary

Leakage emissions resulting from fuel extraction, processing, liquefaction, transportation, re-gasification and distribution of fossil fuels outside of the project boundary shall be considered, as per the guidance provided in the leakage section of ACM0009. In case leakage emissions in the baseline situation are higher than leakage emissions in the project situation, leakage emissions will be set to zero.

For the purpose of determining fugitive methane emissions associated with the production – and in case of natural gas, the transportation and distribution of the fuels – project participants should multiply the quantity of natural gas consumed in all consumption sources *i* (ie equivalent to all "element processes *i* " in ACM0009/Version 03.2) with a methane emission factor for these upstream emissions ($EF_{NG,upstream,CH4}$), and subtract for all fuel types *k* which would be used in the absence of the project activity the fuel quantities multiplied with respective methane emission factors ($EF_{k,upstream,CH4}$), as follows:

$$LE_{CH4,y} = \left[FF_{project,y} \cdot NCV_{NG,y} \cdot EF_{NG,upstream,CH4} - \sum_k FF_{baseline,k,y} \cdot NCV_k \cdot EF_{k,upstream,CH4} \right] \cdot GWP_{CH4} \quad \mathbf{(17)}$$

with

$$FF_{project,y} = \sum_i FF_{project,i,y} \quad \mathbf{(18)}$$

and

$$FF_{baseline,k,y} = \sum_i FF_{baseline,i,k,y} \quad \mathbf{(19)}$$

Where:

$LE_{CH4,y}$ 1. 2. Leakage emissions due to upstream fugitive CH_4 emissions in the year *y* in t CO_2e

$FF_{project,y}$	=	Quantity of natural gas combusted in all element processes during the year *y* in m³
$FF_{project,i,y}$	=	Quantity of natural gas combusted in the element process *i* during the year *y* in m³
$NCV_{NG,y}$	=	Average net calorific value of the natural gas combusted during the year *y* in GJ/m³
$EF_{NG,upstream,CH4}$	=	Emission factor for upstream fugitive methane emissions from production, transportation and distribution of natural gas in t CH_4per GJ fuel supplied to final consumers
$FF_{baseline,k,y}$	=	Quantity of fuel type *k* (a coal or petroleum fuel type) that would be combusted in the absence of the project activity in all element processes during the year *y* in a volume or mass unit
$FF_{baseline,i,k,y}$	=	Quantity of fuel type *k* (a coal or petroleum fuel type) that would be combusted in the absence of the project activity in the element process *i* during the year *y* in a volume or mass unit
NCV_k	=	Average net calorific value of the fuel type *k* (a coal or petroleum fuel type) that would be combusted in the absence of the project activity during the year *y* in GJ per volume or mass unit
$EF_{k,upstream,CH4}$	=	Emission factor for upstream fugitive methane emissions from production of the fuel type *k* (a coal or petroleum fuel type) in t CH_4per GJ fuel produced
GWP_{CH4}	=	Global warming potential of methane valid for the relevant commitment period

Where reliable and accurate national data on fugitive CH_4 emissions associated with the production, and in case of natural gas, the transportation and distribution of the fuels is available, project participants should use this data to determine average emission factors by dividing the total quantity of CH_4 emissions by the quantity of fuel produced or supplied respectively.[29] Where such data is not available, project participants may use the default values provided in Table C.3.1 below. In this case, the natural gas emission factor for the location of the project should be used, except in cases where it can be shown that the relevant system element (gas production and/or processing/transmission/distribution) is predominantly of recent vintage and built and operated to international standards, in which case the US/Canada values may be used.

Note that the emission factor for fugitive upstream emissions for natural gas ($EF_{NG,upstream,CH4}$) should include fugitive emissions from production, processing, transport and distribution of natural gas, as indicated in the Table C.3.1 below. Note further that in case of coal the emission factor is provided based on a mass unit and needs to be converted in an energy unit, taking into account the net calorific value of the coal.

[29] GHG inventory data reported to the UNFCCC as part of national communications can be used where country-specific approaches (and not IPCC Tier 1 default values) have been used to estimate emissions.

Table C.3.1: Default emission factors for fugitive CH_4 upstream emissions[30]

Activity	Unit	Default emission factor	Reference for the underlying emission factor range in Volume 3 of the *1996 Revised IPCC Guidelines*
Coal			
Underground mining	t CH4 / kt coal	13.4	Equations 1 and 4, p. 1.105 and 1.110
Surface mining	t CH4 / kt coal	0.8	Equations 2 and 4, p.1.108 and 1.110
Oil			
Production	t CH4 / PJ	2.5	Tables 1-60 to 1-64, p. 1.129 - 1.131
Transport, refining and storage	t CH4 / PJ	1.6	Tables 1-60 to 1-64, p. 1.129 - 1.131
Total	t CH4 / PJ	4.1	
Natural gas			
USA and Canada			
Production	t CH4 / PJ	72	Table 1-60, p. 1.129
Processing, transport and distribution	t CH4 / PJ	88	Table 1-60, p. 1.129
Total	t CH4 / PJ	160	
Eastern Europe and former USSR			
Production	t CH4 / PJ	393	Table 1-61, p. 1.129
Processing, transport and distribution	t CH4 / PJ	528	Table 1-61, p. 1.129
Total	t CH4 / PJ	921	
Western Europe			
Production	t CH4 / PJ	21	Table 1-62, p. 1.130
Processing, transport and distribution	t CH4 / PJ	85	Table 1-62, p. 1.130
Total	t CH4 / PJ	105	
Other oil exporting countries / Rest of world			
Production	t CH4 / PJ	68	Table 1-63 and 1-64, p. 1.130 and 1.131
Processing, transport and distribution	t CH4 / PJ	228	Table 1-63 and 1-64, p. 1.130 and 1.131
Total	t CH4 / PJ	296	

Note: The emission factors in this table have been derived from IPCC default Tier 1 emission factors provided in Volume 3 of the 1996 Revised IPCC Guidelines, by calculating the average of the provided default emission factor range.

SSC CPAs that don't use natural gas as fuel ie $FF_{project,y} = 0$, will result in $LE_{CH4,y}$ resulting in a negative value, ie negative leakage emissions. Hence $LE_{CH4,y}$shall be set to cero in such cases

CO_2 emissions from LNG

Where applicable, CO_2 emissions from fuel combustion / electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system ($LE_{LNG,CO2,y}$) should be estimated by multiplying the quantity of natural gas combusted in the project with an appropriate emission factor, as follows:

[30] While using values from this table in the equation 6, make the required corrections in the units.

$$LE_{LNG,CO2,y} = FF_{project,y} \cdot EF_{CO2,upstream,LNG} \quad \textbf{(20)}$$

Where:

$LE_{LNG,CO2,y}$	=	Leakage emissions due to fossil fuel combustion/electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system during the year *y* in t CO_2e
$FF_{project,y}$	=	Quantity of natural gas combusted in all element processes during the year *y* in m^3
$EF_{CO2,upstream,LNG}$	=	Emission factor for upstream CO_2 emissions due to fossil fuel combustion/electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system

Where reliable and accurate data on upstream CO_2 emissions due to fossil fuel combustion/electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system is available, project participants should use this data to determine an average emission factor. Where such data is not available, project participants may assume a default value of 6 t CO_2/TJ as a rough approximation.[31]

Leakage emissions for the SSC-CPA, **LE y =** <<>>tCO_2 /yr

D. Emissions Reductions

ERy = BEy – (PEy + LEy)

= <<>> - (<<>> +<<>>)

[31] This value has been derived on data published for North American LNG systems. "Barclay, M. and N. Denton, 2005.Selecting offshore LNG process. <http://www.fwc.com/publications/tech_papers/files/LNJ091105p34-36.pdf> (10th April 2006)".

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

Data / Parameter	$E_{grid,y}$
Unit	MWh
Description	Amount of grid electricity displaced by project in year y
Source of data	Project site measurement
Value(s) applied	<<>>
Measurement methods and procedures	Measurements are undertaken using energy meters.
Monitoring frequency	Continuous monitoring, hourly measurement and monthly aggregated.
QA/QC procedures	Measurements are undertaken using energy meters certified to national or international standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Used to estimate Baseline emissions
Additional comment	Data shall be electronically archived and held for a period of two years from the end of the crediting period. Net electricity generated by the cogeneration power plant system i.e. excluding parasitic loads.

Data / Parameter	$E_{capt,y}$
Unit	MWh
Description	Amount of captive electricity displaced by project in year y
Source of data	Project site measurement
Value(s) applied	<<>>
Measurement methods and procedures	Measurements are undertaken using energy meters.
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording.
QA/QC procedures	Electrical meters certified to national or international standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years. Measurement results shall be cross checked with records for sold/purchased electricity (e.g., invoices/receipts).
Purpose of data	Used to estimate baseline emissions
Additional comment	Only applicable to Project Scenario Type 2 SSC CPAs where the baseline scenario may include captive power plants as the source of power used to run the baseline cooling system and provide the building's electrical needs. Otherwise, please delete.

Data / Parameter	$C_{P,I,y}$
Unit	MWh_{th}/year
Description	Cooling output of the baseline chiller *i* displaced as a result of the installation of project activity in year *y*
Source of data	Project site measurements
Value(s) applied	<<>>
Measurement methods and procedures	Measurements are undertaken using heat meters.
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording.
QA/QC procedures	Heat meters certified to national or international standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years. Cross checked against invoices of cooling sold.
Purpose of data	Used to estimate baseline emissions
Additional comment	Monitored for each chiller *i*.(delete this table if the waste heat from the cogeneration system is used to meet heat loads only)

Data / Parameter	$m_{C, i, h}$
Unit	tonnes/hour
Description	The chilled water mass flow-rate for chiller(s) *i* produced by project in hour *h* of year *y*
Source of data	Project site measurements
Value(s) applied	<<>>
Measurement methods and procedures	Measurements are undertaken using flowmeters.
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording.
QA/QC procedures	Flowmeters certified to national or international standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years
Purpose of data	Used to estimate baseline emissions
Additional comment	Metered for each chiller. Mass flow measured by the heat flowmeter when such meter is installed. (delete this table if the waste heat from the cogeneration system is used to meet heat loads only)

Data / Parameter	$\Delta T_{C,i,h}$
Unit	°C
Description	Differential temperature for chiller(s) i in hour h of year y of incoming and outgoing water from project
Source of data	Project site measurements
Value(s) applied	<<>>
Measurement methods and procedures	Measured using calibrated temperature sensing equipment.
Monitoring frequency	Continuous, integrated hourly, at least monthly recording.
QA/QC procedures	Measurements are undertaken instruments certified to national or international standards and recalibrated or replaced at appropriate intervals according to manufacturer specifications, but at least once in three years
Purpose of data	Used to estimate baseline emissions
Additional comment	Temperature difference determined by the heat meter when such meter is installed. .(delete this table if the waste heat from the cogeneration system is used to meet heat loads only)

Data / Parameter	$m_{H,I,h}$
Unit	tonnes/hour
Description	The water mass flow-rate from heater unit(s) i in year y
Source of data	Project site measurements
Value(s) applied	<<>>
Measurement methods and procedures	Measured using calibrated meters.
Monitoring frequency	Continuous, integrated hourly, at least monthly recording.
QA/QC procedures	Measurements are undertaken using flowmeters certified to national or international standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Used to determine baseline emissions
Additional comment	Mass flow measured by the heat meter when such a meter is installed. (delete this table if the waste heat from the cogeneration system is used to meet cooling loads only)

Data / Parameter	$\Delta T_{H,I,h}$
Unit	°C
Description	Differential temperature of incoming and outgoing water from heater unit *i*
Source of data	Project Site measurement
Value(s) applied	<<>>
Measurement methods and procedures	Measured using calibrated temperature sensing equipment.
Monitoring frequency	Continuous, integrated hourly, at least monthly recording.
QA/QC procedures	Measurements are undertaken using instruments certified to national or international standards and recalibrated or replaced at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Used to estimate baseline emissions
Additional comment	$\Delta T_{H,I,h}$ measured by the heat flowmeter when such meter is installed. (delete this table if the waste heat from the cogeneration system is used to meet cooling loads only)

Data / Parameter	$S_{p,y}$
Unit	TJ/y
Description	Thermal energy delivered by the project activity in year *y*
Source of data	Project site measurement
Value(s) applied	<<>>
Measurement methods and procedures	Thermal energy production is determined as the difference of the enthalpy of the steam or hot water generated by the heat generation equipment and the sum of the enthalpies of the feed-fluid and any condensate returns. The respective enthalpies should be determined based on the mass (or volume) flows and the temperatures. Steam tables or appropriate thermodynamic equations may be used to calculate the enthalpy as a function of temperature and pressure In case of equipment that produces hot water/oil this is expressed as difference in the enthalpy between the hot water/oil supplied to and returned by the plant. In case the project activity is exporting heat to other facilities, the metering shall be carried out at the recipient's end. Measured using calibrated meters.
Monitoring frequency	Continuous, integrated hourly, at least monthly recording.
QA/QC procedures	Measurements are undertaken using instruments certified to national or international standards and recalibrated or replaced at appropriate intervals according to manufacturer specifications, but at least once in three years. Cross checked against invoices for heat sold in the form of steam.
Purpose of data	Used to estimate baseline emissions
Additional comment	(delete this table if the waste heat from the cogeneration system is used to meet cooling loads only)

Data / Parameter	T_{st}
Unit	°C
Description	Temperature of Steam
Source of data	Project site measurement
Value(s) applied	<<>>
Measurement methods and procedures	Measured using calibrated temperature sensors..
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording
QA/QC procedures	Measurements are undertaken using instruments certified to national or international standards and recalibrated or replaced at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Used to estimate baseline emissions
Additional comment	Used to determine enthalpy of steam required to determine $S_{p,y}$ if heat meters are not used. (delete this table if the waste heat from the cogeneration system is used to meet cooling loads only)

Data / Parameter	P_{st}
Unit	kg/cm^2
Description	Steam Pressure
Source of data	Project site measurement
Value(s) applied	Described in SSC CPA DD
Measurement methods and procedures	Measured using calibrated temperature sensors.
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording.
QA/QC procedures	Measurements are undertaken using instruments certified to national or international standards and recalibrated or replaced at appropriate intervals according to manufacturer specifications, but at least once in three years.
Purpose of data	Used to estimate baseline emissions
Additional comment	Used to determine enthalpy of Steam required for the determination of $S_{p,y}$ if heat meters are not used. (delete this table if the waste heat from the cogeneration system is used to meet cooling loads only)

Data / Parameter	
Unit	MWh
Description	Quantity of fossil fuel/electricity consumed by the equipment (e.g., chiller, heater, boiler) which remain operational during the project activity during the year *y*
Source of data	Onsite measurements
Value(s) applied	<<>>
Measurement methods and procedures	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" and "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"
Monitoring frequency	As per the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" and "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"
QA/QC procedures	
Purpose of data	Used to determine baseline emissions
Additional comment	Only applicable to Project Scenario Type 2 SSC CPAs (which are implemented in existing buildings)

Data / Parameter	$FC_{i,j,y}$
Unit	Mass or volume unit per year (e.g. ton/yr or m^3/yr)
Description	Quantity of fossil fuel type j combusted in year *y*
Source of data	Onsite measurements
Value(s) applied	<<>>
Measurement methods and procedures	Either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift).
Monitoring frequency	Continuously monitored
QA/QC procedures	Meters ccertified to national or international standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift). The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes. Where the purchased fuel invoices can be identified specifically for the CDM project, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records.
Purpose of data	Used to estimate project emissions
Additional comment	

<table>
<tr><td>Data / Parameter</td><td>$NCV_{i,y}$</td></tr>
<tr><td>Unit</td><td>GJ per mass or volume unit (e.g. GJ/m^3, GJ/ton)</td></tr>
<tr><td>Description</td><td>Weighted average net calorific value of 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 suppliers in invoices</td><td>This is the preferred source if the carbon fraction of the fuel is not provided (Option A)</td></tr>
<tr><td>Measurements by the project participants</td><td>If a) is not available</td></tr>
<tr><td>Regional or national default values</td><td>If a) is not available</td></tr>
<tr><td>IPCC default values at the upper 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>If (a) is not available</td></tr>
</table></td></tr>
<tr><td>Value(s) applied</td><td><<>></td></tr>
<tr><td>Measurement methods and procedures</td><td>For a) and b): Measurements should be undertaken in line with national or international fuel standards.</td></tr>
<tr><td>Monitoring frequency</td><td>For a) and b): The NCV should be obtained for each fuel delivery, from which weighted average annual values should be calculated
For c): Review appropriateness of the values annually
For d): Any future revision of the IPCC Guidelines should be taken into account</td></tr>
<tr><td>QA/QC procedures</td><td>Verify if the values under a), b) and c) are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements. The laboratories in a), b) or c) should have ISO17025 accreditation or justify that they can comply with similar quality standards.</td></tr>
<tr><td>Purpose of data</td><td>Used to estimate project emissions</td></tr>
<tr><td>Additional comment</td><td></td></tr>
</table>

<table>
<tr><td>Data / Parameter</td><td>$EF_{CO2,i,y}$</td></tr>
<tr><td>Unit</td><td>t CO_2/GJ</td></tr>
<tr><td>Description</td><td>Weighted average CO_2 emissions factor of fossil fuel type i in year y</td></tr>
<tr><td>Source of data</td><td>
<table>
<tr><td>Data Source</td><td>Conditions for using the data source</td></tr>
<tr><td>Values provided by the fuel suppliers in invoices</td><td>This is the preferred source</td></tr>
<tr><td>Measurements by the project participants</td><td>If a) is not available</td></tr>
<tr><td>Regional or national default values</td><td>If a) is not available

These sources can only be used on well documented, reliable sources (such as national energy balances)</td></tr>
<tr><td>IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol, 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories</td><td>If (a) is not available</td></tr>
</table>
</td></tr>
<tr><td>Value(s) applied</td><td><<>></td></tr>
<tr><td>Measurement methods and procedures</td><td>For a) and b): Measurements should be undertaken in line with national or international fuel standards

For a): If the fuel supplier does provide the NCV value and the CO_2 emissions factor on the invoice and these two values are based on measurements for this specific fuel, this CO_2 factor should be used. If another source for the CO_2 emissions factor is used or no CO_2 emissions factor is provide, Options b), c) or d) should be used</td></tr>
<tr><td>Monitoring frequency</td><td>For a) and b): The CO2 emission factor should be obtained for each fuel delivery, from which weighted average annual values should be calculated.
For c): Review appropriateness of the values annually
For d): Any future revision of the IPCC Guidelines should be taken into account</td></tr>
<tr><td>QA/QC procedures</td><td></td></tr>
<tr><td>Purpose of data</td><td>Used to estimate project emissions</td></tr>
<tr><td>Additional comment</td><td>Applicable where option B is used.</td></tr>
</table>

Data / Parameter	$EC_{PJ,j,y}$
Unit	MWh/yr
Description	Quantity of electricity consumed by the Cogeneration system in year y
Source of data	Project site measurement
Value(s) applied	<<>>
Measurement methods and procedures	Measurements are undertaken using energy meters.
Monitoring frequency	Continuous monitoring, hourly measurement and monthly aggregated.
QA/QC procedures	Meters certified to national or international standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years. Data shall be electronically archived and held for a period of two years from the end of the crediting period. Data shall be electronically archived and held for a period of two years from the end of the crediting period. Meter location to be selected to ensure that any electricity imported by the cogeneration system is measured
Purpose of data	Used to estimate project emissions
Additional comment	Refers to any electricity drawn from the grid.

Data / Parameter	$Q_{ref,PJ,start}$
Unit	Tonnes
Description	Quantity of refrigerant charge in new cooling equipment at its start of operation (only accounted for in the first year of the first crediting period) (tonnes)
Source of data	Manufacturer’s specifications of the cooling equipment installed
Value(s) applied	Described in SSC CPA DD
Measurement methods and procedures	--
Monitoring frequency	Only accounted for in the first year of the first crediting period
QA/QC procedures	
Purpose of data	Used to estimate project emissions
Additional comment	(delete this table if the waste heat from the cogeneration system is used to meet heating loads only)

Data / Parameter	$Q_{ref, PJ,y}$
Unit	tonnes/year
Description	Quantity of refrigerant used in year *y* to replace refrigerant that has leaked in year *y*
Source of data	Onsite measurements of the quantity of refrigerant used for top up to compensate for the leaked quantity and value for typical refrigerant leakage rate as determined from the Emissions Factors provided in the IPCC 2006 Guidelines, Chapter 7, Table. 7.9 "Estimates for charge, lifetime and emissions factors for refrigeration and air conditioning systems".
Value(s) applied	Described in SSC CPA DD
Measurement methods and procedures	Two options are given in AMS II.K. Version 02.0 Option A: using the higher of the two quantities below: The monitored quantity of refrigerant used for top up to compensate for the leaked quantity during the year *y*. based on inventory of refrigerant cylinders consumed in year y, e.g. the total amount of refrigerant ordered as indicated in purchase orders. The typical refrigerant leakage rate for the type of cooling equipment as determined from the Emission Factors (expressed in terms percentage of the initial charge/year) provided in the IPCC 2006 Guidelines, Chapter 7, Table 7.9 "Estimates for charge, lifetime and emissions factors for refrigeration and air conditioning systems". Option B: use a default value of 35% of the initial refrigerant charge, i.e. $Q_{ref,PJ,y} = 0.35 * Q_{ref,PJ,start}$
Monitoring frequency	Annually
QA/QC procedures	Quantity of refrigerant ordered is cross checked against invoices (only if option A is chosen)
Purpose of data	Used to estimate project emissions
Additional comment	(delete this table if the waste heat from the cogeneration system is used to meet heating loads only)

Data / Parameter	$FF_{project,y}$
Unit	m^3
Description	Quantity of natural gas combusted in the gas consumption sources *i* in the Cogeneration system during the year *y*
Source of data	On –site measurements
Value(s) applied	<< >>
Measurement methods and procedures	As per ACM0009 Measured using calibrated volumetric flowmeters.
Monitoring frequency	Continuous monitoring. Integrated hourly and at least monthly recording.
QA/QC procedures	Meters to be certified to national or international standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in three years. The consistency of metered fuel consumption quantities should be crosschecked by an annual energy balance that is based on purchased quantities and stock changes. Where the purchased fuel invoices can be identified specifically for the CDM project, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records
Purpose of data	Used to estimate leakage
Additional comment	Each individual gas consumption source that is part of the cogeneration system does not have to be fitted with a meter as long as it is fed from a line to which other gas consumption sources are connected to and fed from as well. In such cases, the gas consumption data used for monitoring purposes shall be obtained from the gas meter that measures the total of gas consumed by such sources.

B.7.2. Description of the monitoring plan for a generic CPA

>> The monitoring plan details the actions necessary to record all the data parameters required by the methodology AMS II K Version 02.0 as detailed in section B.7.1 above. Details of the monitoring procedures and frequency of monitoring are described for each parameter in this section. All data will be recorded at the specified frequency.

Monitoring Plan Objective and Organization

<<name of the entity responsible for operation and management of data monitoring and collection>> will operate and manage the data monitoring and collection. <<name of SSC – CPA Implementer>>operatives will be based on site permanently carrying our regular checks and scheduled maintenance. The data collection system will be located on site and supervised by << SSC CPA Implementer name >>personnel.

Monitoring Data and archiving

Data to be monitored will be recorded at the appropriate frequency in accordance with the methodology. <<name of the SSC CPA Implementer >>will be responsible for collecting the monitoring data and calibration certificates where applicable. The data will be archived electronically, backed up regularly,

and be stored by << name of the SSC CPA implementer>>, and held for 2 years after the end of the crediting period.<< SSC CPA Implementer >>will provide the Coordinating Entity, i.e.CES Carbon Services Ltd, with full data records and the corresponding calibration certificates. The data will be archived electronically, backed up regularly, and be stored by the coordinating entity for 2 years after last issuance of CERs of this project.

Quality Assurance and Quality Control

<< SSC CPA Implementer>>will implement systems and procedures to ensure the measuring equipment is kept at optimum working condition and being maintained as per manufacturer's requirements. Meters readings verification will take place on regular basis to confirm electronic and hardware readings. The metering devices and instrumentation will be calibrated periodically as per standard industry norms and requirements. All operatives will be adequately trained and familiarized to carry out the required tasks.

4. Other provisions [Only applicable for Project Scenario Type 2 SS CPAs in cases in which baseline energy equipment (power plant, chiller and/or heaters) is removed from the site. If not applicable, please delete]

If the baseline energy equipment (power plant, chiller and/or heaters)is to be removed from the site the SSC-CPA shall provide the CME with evidence that the equipment in question has been destroyed. Destruction of the equipment shall be witnessed, photographed (still and video), and certified by an independent third party, such as, a government official, university lecturer or another independent party.

The location of the monitoring points is shown Figure 3. below.

Figure 3. Monitoring Diagram

<< insert Monitoring schematic>>

- - - - -

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

Organization	CES Carbon Services
Street/P.O. Box	44-45 Clontarf Road
Building	1 The Seapoint Building
City	Dublin
State/Region	
Postcode	3
Country	Ireland
Telephone	00 353 1854 28 00
Fax	
E-mail	
Website	
Contact person	Tom Marren
Title	
Salutation	
Last name	Marren
Middle name	
First name	Tom
Department	
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	Tom.marren@cesenergy.com

Appendix 2: Affirmation regarding public funding

The project does not involve any public funding.

Appendix 3: Application of methodology(ies)

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

<< Provide Grid Emissions Factor information in this section>>

Appendix 5: Further background information on the monitoring plan

The monitoring parameters and description of monitoring is shown in section B.7.2

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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 small-scale CDM programmes of activities" (EB 66, Annex 13).
01	EB33, Annex43 27 July 2007	Initial adoption.
Decision Class: Regulatory **Document Type:** Form **Business Function:** Registration		