المجلس العالمي للبصمة الكربونية
GLOBAL CARBON COUNCIL

Methodology for Water Grid Connected Renewable Energy Based Desalination Plant

GCCM004

V1.0 - 2022

CONTENTS

1. Baseline and Monitoring Methodologies of GCC

1. Global Carbon Council (GCC) is MENA region's first and only voluntary carbon offsetting program that aims to contribute to a vision of sustainable and low carbon economy of the region and help to catalyse climate actions on the ground. Refer www.globalcarboncouncil.com for details.

2. GCC methodologies facilitate the project owners of eligible greenhouse gas (GHG) reduction projects to calculate emission reduction of their projects, monitor the emission reductions and develop the project submission in accordance with the methodologies.

3. This methodology is for construction and operation of greenfield water desalination plants, which are partially or fully powered by onsite electrical/thermal renewable energy and the produced water is supplied to water grid, which is transmitted to end users.

2. Source/s of this Baseline and Monitoring Methodology

4. For the development of GCC methodologies, the requirements of the 'GCC Program Manual' (paragraphs 43-46) and 'Standard for Development of Methodologies' are applied. The determination of baseline scenario and baseline emissions are consistent with UNFCCC's Clean Development Mechanism (CDM) guideline "Guideline for determining baseline for measure/s" (Baseline Guideline) referred in the above standard.

5. This methodology also refers to the latest approved versions of the following GCC methodologies and tools and guidelines of CDM:

   a) TOOL 07 "Tool to calculate the emission factor for an electricity system"
   b) TOOL 05 "Tool to calculate baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation"
   c) TOOL 01 "Tool for Demonstration and Assessment of Additionality"
   d) TOOL 03 "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"
   e) TOOL 09 "Determining the baseline efficiency of thermal or electrical energy generation systems"
   f) TOOL 16 "Project and leakage emissions from biomass"
   g) GCCM001: Methodology for Renewable Energy Generation Projects Supplying Electricity to Grid or Captive Consumers

6. This methodology is developed by GCC in collaboration with Taweelah RO desalination company LLC and Abu Dhabi Future Energy Company PJSC- Masdar

3. Description of key terms

7. Following description of key terms apply to the projects using this methodology:

Sr. No.	Key Term	Description
1	Water grid	Water grid is a potable water distribution network that supply desalinated water to the users
2	Installed Desalination Capacity	Installed desalination capacity (or installed capacity or nameplate capacity) of a desalination plant - is the capacity, expressed in m^3/h (cubic meters per hour) or equivalent, for which the desalination plant has been designed to operate at nominal conditions
3	Greenfield Desalination Plant	Greenfield desalination plant – is a desalination plant that is constructed on a site where there is no desalination plant operating prior to the implementation of the project activity
4	Reverse Osmosis	Reverse osmosis (RO) - is a water purification process that uses a membrane to separate ions, unwanted molecules and larger particles from water
5	Renewable Energy based RO	Renewable Energy based RO - is a RO plant which is partially or fully powered by onsite renewable energy

4. Applicable Project Activities and their Eligibility Conditions

8. The project activities eligible under this methodology aim to build and operate a greenfield energy efficient reverse osmosis (RO) based water desalination plants which are partially or fully powered by onsite electrical/thermal renewable energy and the produced water is supplied to water grid, which is transmitted to end users.

9. The project activities are applicable under following conditions:

- There shall be an established water grid to supply potable water to its consumers and all the desalination plants identified in the baseline scenario and the project plant are connected to this water grid.

- The share of onsite installed electrical/thermal renewable energy[1] powering the desalination plant under the project activity shall be the following:

[1] The share of renewable energy shall be calculated at the start date of the project activity or global stakeholder consultation of the project activity, whichever comes first. The share is calculated by (total onsite installed renewable energy in MW/total power requirement for project activity in MW)

- In case of electricity powered project desalination plants (e.g. RO), the share of renewable energy electricity supplied to the desalination plant shall be the higher value between:

    a) the percentage share of renewable energy (capacity in MW) in the national electricity grid[2]
    or
    b) minimum 50% in the total required nominal electrical capacity (in MW)[3] for the project desalination plant.

- In case of thermal energy powered project desalination plants, the renewable energy share of thermal energy supplied to the desalination plant (e.g. steam supplied to plant in MJ) shall be more than 50 % of the total thermal energy (e.g. total steam in MJ) supplied to the project desalination plant.

10. Project activity delivers desalinated water of quality in accordance to applicable local standards.

11. The applicability conditions included in the tools referred to above shall apply, when the tools are used.

5. Sectoral Scope applicable to GCC verifier

12. The sectoral scopes eligible under GCC have been defined in section 3.2 of 'Standard for Development of Methodologies'.

13. Only a third-party verifier approved under GCC for the sectoral scope 1: Energy Industries (renewable/non-renewable sources) can conduct Project Verification or Emission Reduction Verification of GCC project that applies this methodology.

6. Project Boundary

14. The spatial extent of the project boundary encompasses the project desalination plant(s)/unit(s), including all the installations from the feed water capture to storage of desalinated water prior to its distribution, as well as all facilities that supply energy to the project activity including renewable energy plant and the electricity grid such facilities are connected to. It also includes all desalination plants connected physically to the project's water grid.

    The GHGs included in or excluded from the project boundary are listed in Table 1.

[2] The share of renewable energy should be considered based on the published literature. Project proponents may use the latest published IRENA statistics. Latest available https://irena.org/publications/2022/Apr/Renewable-Capacity-Statistics-2022

[3] Capacity in MW for different renewable technologies should be considered in relevant applicable metrics such as MWp for photovoltaic system, etc.

Table 1: Emission sources included in or excluded from the project boundary

Source		GHG	Included	Justification/explanation	Determination of Emissions
Baseline	CO_2 emissions from water desalination in the baseline due to the thermal and electrical energy consumption	CO_2	Yes	Main emission source	As described in baseline emission section
		CH_4	No	Minor emission source	
		N_2O	No	Minor emission source	
Project Activity	CO2 emissions from water desalination in the project activity due to the electrical energy consumption	CO_2	Yes	Main emission source	CDM Tool: "Tool to calculate baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation"
		CH_4	No	Minor emission source	
		N_2O	No	Minor emission source	
	CO2 emissions from water desalination in the project activity due to the fossil fuel combustion	CO_2	Yes	Main emission source	CDM Tool: "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"
		CH_4	No	Minor emission source	
		N_2O	No	Minor emission source	
	CO2 emissions from water desalination in the project activity due to the biomass consumption	CO_2	Yes	Main emission source	CDM Tool: "Project and leakage emissions from biomass"
		CH_4	No	Minor emission source	
		N_2O	No	Minor emission source	

7. Baseline Scenario

15. The rationale as per Guidelines for determination of baselines for measure(s)[4] is that the quantity of water supplied to the grid by the project activity would be generated by the operation of existing water grid connected desalination plants and by the addition of new generation sources into the water grid.

16. Hypothetically it means that a desalination plant with emission factor equivalent to that of the existing water grid mix would have supplied desalinated water in absence of new project plant. The baseline water grid emission factor is a reasonable benchmark that approximates performance of the baseline desalination plant.

8. Additionality

17. Project participants shall apply the latest version of CDM "TOOL01: Tool for the demonstration and assessment of additionality".

9. Baseline emissions

18. Baseline emissions in year *y* are product of water delivered to the water grid in year *y* by the project activity and the emission factor of build margin of sample group of desalination plants in the wate grid in year *y*. The emission factor is generation weighted average emission factor of build margin sample group of desalination plants in the water grid operated in similar social, economic, environmental and technological circumstances.

$$BE_y = Q_{W,PJ,y} \times EF_{WG,SAMPLE,y} \qquad \textit{Equation (1)}$$

Where:

BE_y	=	Baseline emissions due to production of desalinated water by project desalination plant(s)/unit(s) in year *y* (tCO_2)
$Q_{W,PJ,y}$	=	Quantity of desalinated water produced by project desalination plant(s)/unit(s) in year *y* (m^3)
$EF_{WG,SAMPLE,y}$	=	Emission factor of build margin sample group of desalination plants in the water grid in year *y* (tCO_2/m^3)

9.1 Calculation of emission factor of build margin desalination plants in the water-grid

19. The project activity will replace the equivalent quantity of the desalinated water in the water grid to which it is either connected or planned to be connected.

20. The baseline emission factor is the water generation weighted average emission factor and shall be determined for similar project activities excluding desalination plants

[4] https://cdm.unfccc.int/Reference/Guidclarif/meth/meth_guid50.pdf

registered as GCC project activities for the build margin sample group of desalination plants in the water grid as follows:

$$EF_{WG,SAMPLE,y} = \frac{\sum_p \left(Q_{W,p,y} \times EF_{p,y}\right)}{\sum_p \left(Q_{W,p,y}\right)} \qquad \textit{Equation (2)}$$

Where:

$Q_{W,p,y}$	=	Quantity of desalinated water produced by each desalination plant *p* in year *y* (m^3)
$EF_{p,y}$	=	Emission factor of each desalination plant *p* in year *y* (tCO_2/m^3)\
p	=	Desalination plants included in the build margin

21. The sample group of desalination plants *p* used to calculate the build margin should be determined as per the following procedure:

    a. Identify the set of five desalination plants, excluding desalination units registered as GCC project activities, that started to supply desalinated water to the water grid most recently ($SET_{5\ units}$) and determine their annual desalinated water generation ($AWG_{SET\text{-}5\text{-}units}$, in m^3);

    b. Determine the annual desalinated water generation of the water grid, excluding desalination plants registered as GCC project activities (AWG_{total}, in m^3). Identify the set of desalination plants, excluding those plants registered as GCC project activities, that started to supply desalinated water to the water grid most recently and that comprise 20 per cent of AWG_{total} (if 20 per cent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\ per\ cent}$) and determine their annual quantity of desalinated water generation ($AWG_{SET\text{-}\geq 20\ per\ cent}$, in m^3);

    c. From $SET_{5\text{-}units}$ and $SET_{\geq 20\ per\ cent}$ select the set of power units that comprises the larger annual desalinated water generation (SET_{sample}). Identify the date when the desalinated plants in SET_{sample} started to supply desalinated water to the grid. If none of the power units in SET_{sample} started to supply desalinated water to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. Otherwise, exclude from $SET_{5\text{-}units}$ and $SET_{\geq 20\ per\ cent}$ desalination plants which started to supply desalinated water to the water grid more than 10 years ago. These are termed now $SET_{5\text{-}units\text{->}10yrs}$ and $SET_{\geq 20\ per\ cent\text{->}10yrs}$. From $SET_{5\text{-}units\text{->}10yrs}$ and $SET_{\geq 20\ per\ cent\text{->}10yrs}$ select the set of power units that comprises the larger annual desalinated water generation ($SET_{sample\text{->}10yrs}$).

22. Emission factor for the build margin sample group of desalination plants shall be determined as per the following options:

    a. Option 1 – emission factor of build margin sample group of desalination plants can be determined *ex ante* based on the most recent information available on desalination plants operating and connected to water-grid at the time of submission of PSF for GSC,

or

b. Option 2 - emission factor of build margin sample group of desalination plants can be determined *ex post* for the year *y* in which the project activity generates desalinated water, requiring the emissions factor to be updated every three years during monitoring. If the data required to calculate the emission factor for the year prior to monitoring year is usually only available later than six months after the end of that year, alternatively the emission factor of the previous year *y-1* may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year *y-2* may be used. The same data vintage (*y, y-1 or y-2*) should be used throughout the crediting period.

23. The emission factor of each water grid connected desalination plant is calculated using one of the following options:

9.1.1 Option 1 – Based on actual production data of electricity and desalinated water

24. The emission factor of each thermal and electricity-based desalination plant is calculated as follows:

$$EF_{p,y} = \frac{BE_{W,p,y}}{Q_{W,p,y}}$$ *Equation (3)*

Where:

$BE_{W,p,y}$ = Baseline emissions of each desalination plant *p* due to production of desalinated water in year *y* (tCO_2)

25. The baseline emissions of each desalination plant p due to production of desalinated water is calculated as follows:

$$BE_{W,p,y} = \sum_{i} BE_{TH,p,i,y} + \sum_{j} BE_{ELECT,p,j,y}$$ *Equation (4)*

Where:

$BE_{TH,p,i,y}$ = Baseline emissions of each desalination plant *p* of type *i* in year *y* (tCO_2)

$BE_{ELECT,p,j,y}$ = Baseline emissions of each desalination plant *p* of type *j* in year *y* (tCO_2)

i = Thermal desalination plants of type *i* connected to the water-grid

j = Electricity-based desalination plants of type *j* connected to the water-grid

9.1.2 Baseline Emissions for Thermal Desalination Plants

26. The baseline emissions of thermal desalination plants is calculated as follows:

$$BE_{TH,i,p,y} = BE_{TOT,p,i,y} - BE_{ELECT,p,i,y}$$ *Equation (5)*

Where:

$BE_{TOT,p,i,y}$ = Baseline emissions of desalination plant *p* of type *i* due to fossil fuel consumption for electricity and desalinated water generation in year *y* (tCO_2)

$BE_{ELECT,p,i,y}$ = Baseline emissions of the desalination plant *p* of type *i* due to fossil fuel consumption for electricity generation in year *y* (tCO_2)

27. Total baseline emissions due to fossil fuel consumption for electricity and steam generation from the desalination plants is calculated as follows:

$$BE_{TOT,p,i,y} = \sum_{FF} FC_{TOT,FF,p,i,y} \times EF_{FF} \times NCV_{FF,y} \quad \textit{Equation (6)}$$

Where:

$FC_{TOT,FF,p,i,y}$ = Fossil fuel consumption for electricity and steam generation of desalination plant *p* of type *i* in year *y* (volume or mass unit)

28. The baseline emissions due to fossil fuel consumption for electricity generation in desalination plants is calculated as follows:

$$BE_{ELECT,p,i,y} = EG_{GROSS,p,i,y} \times EF_{ELECT,p,i,y} \quad \textit{Equation (7)}$$

Where:

$EG_{GROSS,p,i,y}$ = Gross electricity generation of desalination plant *p* of type *i* in year *y* (MWh)

$EF_{ELECT,p,i,y}$ = Emission factor of desalination plant *p* of type *i* for electricity generation in year *y* (tCO_2/MWh)

29. The emission factor for electricity generated from fossil fuel consumption in desalination plant is calculated as follows:

$$EF_{ELECT,p,i,y} = \frac{\sum FC_{EST,FF,p,i,y} \times EF_{FF}}{EG_{NET,p,i,y}} \quad \textit{Equation (8)}$$

Where:

$FC_{EST,FF,p,i,y}$ = Estimated fossil fuel consumption in desalination plant *p* of type *i* for electricity generation in year y (TJ)

$EG_{NET,p,i,y}$ = Net electricity exported to grid by desalination plant *p* of type *i* in year y (MWh).

30. The fossil fuel consumption for electricity generation in desalination plants is calculated as follows:

$$FC_{EST,FF,p,i,y} = \sum_{t} \frac{EG_{GROSS,p,i,t,y} \times 0.0036}{\eta_{POWER,p,i,t,y}} \quad \textit{Equation (9)}$$

Where:

$EG_{GROSS,p,i,t,y}$	=	Gross electricity generation by technology *t* (e.g. open cycle, combined cycle) in desalination plant *p* of type *i* in year y (MWh)
$\eta_{POWER,p,i,t,y}$	=	Efficiency of power generation of technology *t* in desalination plant *p* of type *i*. The default values as provided in the "TOOL09: Determining the baseline efficiency of thermal or electric energy generation systems", should be used
0.0036	=	Conversion factor MWh to TJ

9.1.3 Baseline Emissions for Electricity-based Desalination Plants

31. Baseline emissions of electricity-based desalination plants is calculated as follows:

$$BE_{ELECT,p,j,y} = EG_{WATER,p,j,y} \times EF_{GRID,y} \qquad \textit{Equation (10)}$$

Where:

$EG_{WATER,p,jy}$	=	Electricity consumption by desalination plant *p* of type *j* for producing desalinated water in year y (MWh)
$EF_{GRID,y}$	=	Emission factor of the electricity grid calculated as combined margin emission factor (tCO_2/MWh). Please follow guidance provided in GCCM001 for calculation of $EF_{grid,y}$

9.1.4 Option 2 - Based on actual steam production

32. If the water-grid consists of only thermal (no co-generation) desalination plants the emission factor of each desalination plant connected to water-grid is calculated as follows:

$$EF_{p,i,y} = \frac{BE_{TH,p,i,y}}{Q_{W,p,i,y}} \qquad \textit{Equation (11)}$$

Where:

$EF_{p,i,y}$	=	Emission factor of desalination plant *p* of type *i* in year *y* (tCO_2/m^3)
$BE_{TH,p,i,y}$	=	Baseline emissions due to steam generation in desalination plant *p* of type *i* for production of desalinated water in year *y* (tCO_2)
$Q_{W,p,i,y}$	=	Quantity of desalinated water generated by desalination plant *p* of type *i* (m^3)

33. The baseline emissions due to steam generation in desalination plant p for production of desalinated water is calculated as follows:

$$BE_{TH,p,i,y} = \sum_{t} BE_{TOT,p,i,t,y} \times \left[\frac{HG_{STEAM,p,i,t,y} / \eta_{STEAM,p,i,t,y}}{\left(HG_{STEAM,p,i,t,y} / \eta_{STEAM,p,i,t,y}\right) + \left(EG_{GROSS,p,i,t,y} / \eta_{POWER,p,i,t,y}\right)} \right] \qquad \textit{Equation (12)}$$

Where:

$BE_{TOT,p,i,t,y}$	=	Bassline emissions of desalination plant p of type *i* having technology *t* due to fossil fuel consumption for electricity and desalination water generation in year *y*, calculated as per equation 6 above (tCO2)
$HG_{STEAM,p,i,t,y}$	=	Total steam input to the desalination plant *p* of type *i* having technology *t* in year *y* (MWh)
$\eta_{STEAM,p,i,t,y}$	=	Efficiency of steam generation of technology *t* in desalination plant *p* of type *i*. The default values as provided in the "TOOL09: Determining the baseline efficiency of thermal or electric energy generation systems", should be used

10. Project Emissions

34. Project emissions correspond to those generated by the project desalination plant(s)/unit(s).

35. Project emissions due to electricity supplied by an electricity grid are calculated as follows:

$$PE_y = EG_{WATER,PJ,y} \times EF_{GRID,y} \qquad \textit{Equation (13)}$$

Where:

$EG_{WATER,PJ,y}$	=	Electricity consumption of the project desalination plant(s)/unit(s) in year *y* (MWh)
$EF_{GRID,y}$	=	CO_2 emission factor of the electricity grid in year *y*. Please follow guidance provided in GCCM001 for calculation of $EF_{grid,y}$

36. Emissions from on-site fossil fuel combustion at the project site are calculated in accordance with the latest approved version of TOOL03 "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".

37. For project activities utilizing biomass and/or biomass residues project emissions are calculated as per the latest approved version of the TOOL16 "Project and leakage emissions from biomass".

11. Leakage Emissions

38. For project activities utilizing biomass and/or biomass residues, the TOOL16 "Project and leakage emissions from biomass".

39. The emissions potentially arising from project activity construction, upstream emissions from fossil fuel use (e.g. extraction, processing, transport etc.) and membrane manufacturing, cleaning and replacement are neglected.

12. Emission reductions

40. Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \qquad \textit{Equation (14)}$$

Where:

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

BE_y = Baseline emissions in year y (tCO_2)

PE_y = Project emissions in year y (tCO_2)

13. Monitoring Methodology

13.1 Parameters <u>not</u> monitored during the crediting period

Data / Parameter Table 1.

Data / Parameter:	**EF_{FF}**
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor of fossil fuel used to produce the steam and/or electricity supplied to the desalination plant
Source of data:	The following data sources may be used if the relevant conditions apply:

Data source	Conditions for using the data source
(a) Values provided by the fuel supplier 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) and (b) are not available These sources can only be used for liquid fuels and should be based on well documented, reliable sources (such as national energy balances)
d) IPCC default values at the lower limit of the uncertainty at a 95 per cent 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 none of the above options are available

Measurement procedures (if any):	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 emission 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 emission factor is used or no CO_2 emission factor is provided, Options (b), (c) or (d) should be used

Quality Procedure, if any:	NA
Any comment:	-

Data / Parameter Table 2.

Data / Parameter:	**Share of renewable energy in the grid**
Data unit:	%
Description:	Renewable energy share of electricity capacity
Source of data:	Published literature, preferably published by multilateral organisation
Measurement procedures (if any):	NA
Quality Procedure, if any:	NA
Any comment:	Data is required to demonstrate the applicability condition of this methodology

Data / Parameter Table 3.

Data / Parameter:	**Share of renewable energy in the project activity**
Data unit:	%
Description:	Renewable energy share of electricity capacity for the project activity
Source of data:	Project activity plant
Measurement procedures (if any):	The parameters will be used based on design parameter i.e. design power requirement for the plant and installed renewable capacity vis-à-vis the connected load to the desalination plant.
Quality Procedure, if any:	NA
Any comment:	Data is required to demonstrate the applicability condition of this methodology. For future project activity this will be checked during first emission reduction verification.

13.2 Parameters for monitoring during the crediting period

Data / Parameter Table M1

Data / parameter:	**$EG_{WATER,PJ,y}$**
Data unit:	MWh
Description:	Electricity consumption of the project desalination plant(s)/unit(s) in year *y*
Source of data:	Project activity site
Measurement procedures (if any):	This parameter should be monitored using bi-directional energy meter
Monitoring frequency:	Continuous monitoring, hourly measurement and at least monthly recording
QA/QC procedures:	The meter should be calibrated periodically based on internal procedure of the project participant and relevant industry standards or national standards
Any comment:	-

Data / Parameter Table M2

Data / Parameter:	**$EF_{GRID,y}$**
Data unit:	tCO_2/MWh
Description:	CO_2 emission factor of the grid electricity in year *y*
Source of data:	-
Measurement procedures (if any):	As per the guidance provided in GCCM001
Any comment:	-

Data / Parameter Table M3

Data / parameter:	**$Q_{W,PJ,y}$ / $Q_{PROJECT\ PLANT,y}$**
Data unit:	m^3
Description:	Quantity of desalinated water produced by project desalination plant(s)/unit(s) in year *y*
Source of data:	Project activity site
Measurement procedures (if any):	This parameter should be monitored using volume flow meters
Monitoring frequency:	Continuous monitoring, hourly measurement and at least monthly recording
QA/QC procedures:	The meter should be calibrated periodically based on internal procedure of the project participant and relevant industry standards or national standards
Any comment:	-

Data / Parameter Table M4

Data / parameter:	**$Q_{W,p,y}$ / $Q_{W,p,i,y}$**
Data unit:	m^3
Description:	Quantity of desalinated water produced by each desalination plant *p* of in year *y*
Source of data:	-
Measurement procedures (if any):	This parameter should be monitored using volume flow meters or to be provided based on publicly available data
Monitoring frequency:	Continuous monitoring, hourly measurement and at least monthly recording or as published
QA/QC procedures:	The meter should be calibrated periodically based on internal procedure of the project participant and relevant industry standards or national standards or published by the government authority
Any comment:	-

Data / Parameter Table M5

Data / parameter:	**$FC_{TOT,FF,p,i,y}$**
Data unit:	Volume or mass unit
Description:	Fossil fuel consumption for electricity and or steam generation of desalination plant *p* of type *i* in year y
Source of data:	Published reports

Measurement procedures (if any):	This parameter should be monitored using volume flow meters or using weighing scales or to be provided based on publicly available data
Monitoring frequency:	Continuous monitoring, hourly measurement and at least monthly recording or as published
QA/QC procedures:	The volume meter or weighing scale should be calibrated periodically based on internal procedure of the project participant and relevant industry standards or national standards or published by government entity
Any comment:	-

Data / Parameter Table M6

Data / parameter:	**$EG_{GROSS,p,i,y}$**
Data unit:	MWh
Description:	Gross electricity generation of desalination plant *p* of type *i* in year y
Source of data:	-
Measurement procedures (if any):	This parameter should be monitored using bi-directional energy meter on publicly available data
Monitoring frequency:	Continuous monitoring, hourly measurement and at least monthly recording or as published
QA/QC procedures:	The meter should be calibrated periodically based on internal procedure of the project participant and relevant industry standards or national standards or published by government entity
Any comment:	-

Data / Parameter Table M7

Data / parameter:	**$EG_{NET,p,i,t,y}$**
Data unit:	MWh
Description:	Net electricity generation of desalination plant *p* of type *i* in year y
Source of data:	-
Measurement procedures (if any):	This parameter should be either monitored using bi-directional energy meter or calculated as difference between (a) the quantity of electricity supplied by the project plant/unit to the grid; and (b) the quantity of electricity delivered to the project plant/unit from the grid. In case it is calculated then the following parameters shall be measured: (a) The quantity of electricity supplied by the project plant/unit to the grid; and (b) The quantity of electricity delivered to the project plant/unit from the grid In case of publicly available, no measurement required.
Monitoring frequency:	Continuous monitoring, hourly measurement and at least monthly recording or as published
QA/QC procedures:	The meter should be calibrated periodically based on internal procedure of the project participant and relevant industry standards or national standards or published by government entity
Any comment:	-

Data / Parameter Table M8

Data / parameter:	**$EG_{GROSS, p,i,t,y}$**
Data unit:	MWh
Description:	Gross electricity generation by technology *t* in desalination plant *p* of type *i* in year y
Source of data:	-
Measurement procedures (if any):	This parameter should be monitored using bi-directional energy meter. In case of publicly available, no measurement required.
Monitoring frequency:	Continuous monitoring, hourly measurement and at least monthly recording or as published.
QA/QC procedures:	The meter should be calibrated periodically based on internal procedure of the project participant and relevant industry standards or national standards or published by government entity
Any comment:	-

Data / Parameter Table M9

Data / parameter:	**$H_{POWER,p,i,t,y}$**
Data unit:	-
Description:	Efficiency of power generation of technology *t* used in desalination plant *p* of type *i* in year *y*
Source of data:	Default efficiency values as provided under "TOOL09: Determining the baseline efficiency of thermal or electric energy generation systems"
Measurement procedures (if any):	-
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data / Parameter Table M10

Data / parameter:	**$EG_{WATER,p,j,y}$**
Data unit:	MWh
Description:	Electricity consumption of the desalination plant *p* of type *j* in year *y*
Source of data:	-
Measurement procedures (if any):	This parameter should be monitored using bi-directional energy meter. In case of publicly available, no measurement required.
Monitoring frequency:	Continuous monitoring, hourly measurement and at least monthly recording or as published.
QA/QC procedures:	The meter should be calibrated periodically based on internal procedure of the project participant and relevant industry standards or national standards or published by government entity
Any comment:	-

Data / Parameter Table M11

Data / parameter:	**$HG_{STEAM,p,i,t,y}$**
Data unit:	ton
Description:	Total steam input to the desalination plant *p* of type *i* having technology *t* in year *y*
Source of data:	Total steam input to the project desalination plant(s)/unit(s) *p* in year y
Measurement procedures (if any):	This parameter should be monitored using volume flow meters
Monitoring frequency:	Continuous monitoring, hourly measurement and at least daily recording. To calculate the annual steam flow, the daily average value of steam flow should be used
QA/QC procedures:	The meter should be calibrated periodically based on internal procedure of the project participant and relevant industry standards or national standards
Any comment:	Convert the steam flow value into MWh for calculation purpose using enthalpy of the steam

Data / Parameter Table M12

Data / parameter:	**$H_{STEAM,p,i,t,y}$**
Data unit:	-
Description:	Efficiency of steam generation of technology *t* used in desalination plant *p* of type *i* in year y
Source of data:	Default efficiency values as provided under "TOOL09: Determining the baseline efficiency of thermal or electric energy generation systems"
Measurement procedures (if any):	-
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	-

Data / Parameter Table M13

Data / parameter:	**$Q_{W,FACILITY,y}$ $Q_{W,PROJECT\ PLANT,y}$**
Data unit:	m^3
Description:	Quantity of desalinated water produced by the entire desalination facility where the project desalination plant(s)/unit(s) is located in year y
Source of data:	Project activity site
Measurement procedures (if any):	This parameter should be monitored using volume flow meters
Monitoring frequency:	Continuous monitoring, hourly measurement and at least monthly recording
QA/QC procedures:	The meter should be calibrated periodically based on internal procedure of the project participant and relevant industry standards or national standards
Any comment:	-

DOCUMENT HISTORY		
Version	**Date**	**Comment**
V 1.0	27/06/2022	Initial adoption by GCC Steering Committee based on following: i. Consideration by individual steering committee member, followed by evaluation of entire steering committee ii. 15-day global stakeholder consultation taken place between 08/06/2022 to 22/06/2022

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