


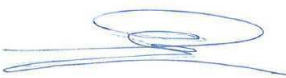


Verification and certification report form for CDM programme of activities

(Version 01.0)

Complete this form in accordance with the "Attachment. Instructions for filling out the verification and certification report form for CDM programme of activities" at the end of this form.

VERIFICATION AND CERTIFICATION REPORT

Title of the programme of activities (PoA)	Solar Water Heater Programme in Tunisia	
UNFCCC reference number of the PoA	4659	
Version number(s) of the PoA-DD(s) applicable to this report	Version 6	
Version number of the verification and certification report	3.0	
Completion date of the verification and certification report	Final version: 24/04/2017	
Monitoring period number	MP 1	
Duration of this monitoring period	13/05/2011 to 31/12/2014	
Number and version number of the monitoring report to which this report applies	4.0 (29/03/2017)	
Coordinating/managing entity (CME)	Agence Nationale pour la Maîtrise de l'Energie - PP	
Host Party(ies)	Host Party(ies) of the PoA	Is this a host Party to a CPA covered in this report?(yes/no)
	Tunisia	Yes
Sectoral scope(s)	Sectoral scope 1 - Energy industries (renewable - / non-renewable sources)	
Selected methodology(ies)	AMS.I.C. Thermal energy production with or without electricity, version 17	
Selected standardized baseline(s)	N/A	
Total estimated GHG emission reductions or net GHG removals for this monitoring period in the included CPA(s) covered in this report	104,596.0 metric tonnes CO ₂ equivalent per annum	
Total certified GHG emission reductions or net GHG removals for this monitoring period for the included CPA(s) covered in this report	90,148.0 tCO ₂ equivalents	
Name of DOE	 LGAI Technological Center, S.A. (Applus+)	
Name, position and signature of the approver of the verification and certification report		

	B.U. System Certification Area Manager: Juan Sendin Caballero
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SECTION A. Executive summary

LGAI Technological Center, S.A. (hereafter referred to as Applus+ LGAI) has been contracted by Agence Nationale pour la Maîtrise de l'Energie-PP to perform the 1st periodical verification of Solar Water Heater Programme in Tunisia (UNFCCC Ref. No.4659) applying the methodology AMS.I.C/ Thermal energy production with or without electricity, version 17. The management of Agence Nationale pour la Maîtrise de l'Energie is responsible for the preparation of the GHG emissions data and the reported GHG emission reductions. A desk review and a site visit have been conducted to verify the data submitted in the monitoring report. The verification is conducted in line with the VVS version 9 requirements. Applus+ LGAI confirms that the following documentation has been reviewed:

- (a) The registered updated PoA-DD as well as CPA-DD's, including the monitoring plan and the applicable validation report;
- (b) The applied monitoring methodology;
- (c) Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board;
- (d) All information and references relevant to the project activity's resulting in emission reductions.

Solar Water Heater Programme in Tunisia (UNFCCC Ref. No.4659) is small-scale programme of activities (hereafter referred to as "the PoA"). It is based on the installation of domestic solar water heaters (hereafter referred to as "SWH") in households throughout Tunisia. The objective of the PoA is to support the development of solar energy for water heating in Tunisia, in line with the 11th Plan set by the Tunisian government.

The PoA is a voluntary action, not required by law, launched in January 2007 by the Tunisian National Agency for Energy Conservation (Agence Nationale pour la Maîtrise de l'Energie – ANME) and is undertaken in conjunction with a nation-wide loan support solar programme known as "Prosol 2 – Residential". The stated goal of the PoA was to install around 30,000 SWH per year in households, thereby displacing carbon intensive electricity from the grid and fossil fuels currently used to provide hot water in the households.

As a result, thanks to PoA it has been installed 103,427 SWH; which means a total number of installed square meters of collectors of each individual CPA remains below the small-scale threshold of 64,000 m² applicable to solar energy projects, as per Appendix B to the decision 21/cp.8 of the document FCCC/CP/2002/7/Add.3. The typical capacity of the storage tank ranges from 200 to 300 litres and the typical surface of the collector is between 2 and 4 m². The capacity and surface varies according to the household's choice and demand.

The project started implementation on 23/01/2007, but only the SWH installed between 01/01/2008 and 31/12/2011 are taken into account for the PoA and the different CPAs. Applus+ LGAI confirms that the project is implemented in accordance with the validated and registered CPA-DD's. The monitoring plan complies with the applied methodology AMS.I.C-Thermal energy production with or without electricity, version 17 and the monitoring has been carried out in accordance with the monitoring plan. The monitoring system is in place and the emission reductions are calculated without material misstatements.

Based on the information reviewed and evaluated Applus+ LGAI confirms that the implementation of the project has resulted in 90,148.0 tCO₂ equivalents emission reductions during period 13/05/2011 - 31/12/2014.

SECTION B. Verification team, technical reviewer and approver

B.1. Verification team members

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk review	On-site inspection	Interview(s)	Verification findings
1.	Team Leader	IR	Sitjes Cabanas	Miquel (MSC)	Applus+ LGAI (Central Site)	X	X	X	X
2.	Auditor	IR	Rodrigo Vega	Natalia (NRV)) ¹	Applus+ LGAI (Central Site)	X	X	X	X

B.2. Technical reviewer and approver of the verification and certification report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	EI	Shen	Simon	Applus+ Shanghai
2.	Approver	IR	Sendin Caballero	Juan	Applus+ LGAI

SECTION C. Means of verification

C.1. Desk review

The Monitoring Report (CDM-PoA-MR) version 01 dated 25/06/2015 (document referred as /01/ in Appendix 3) submitted by the PP was made publicly available on the UNFCCC website before the verification activities started. After one incompleteness which has been detected, MR has been accordingly updated as per version 3, in order to include the scope of the raised incompleteness which was related to post registration changes process. The scope of this Post Registration Changes is to address DOE's requested corrections after on-site assessment conduction which refers to project information, being focused on the already registered PoA and CPA's. These corrections do not affect the design of the PoA and as a result, as per current version of CDM Project Standard, the same do not require prior approval by the CDM Executive Board (the Board).

The published CDM-POA-MR and updated CDM-PoA-MR version 3 (29/09/2016) have been assessed based on all the relevant documents. The aim of the assessment in the desk review was to:

- Verify the completeness of the data and the information presented in the CDM-POA-MR;
- Evaluate the compliance of the CDM-POA-MR with regarding the monitoring plan depicted in the registered PoA—DD Ver 06 dated 16/02/2011 (document referred as /02/ in Appendix 3), with the generic CPA (document /03/) and with the 8 CPA's (different versions and dates, documents: /04/, /05/, /06/, /07/, /08/, /09/, /10/, and /11/).
- Verify that the applied monitoring methodology and monitoring plan were carried out accordingly. In addition, it was applied particular attention to the frequency of measurements, the quality of the metering equipment, the quality assurance and quality control procedures;
- Evaluate the data management and the quality assurance and quality control system in the context of their influence regarding the generation and reporting of emission reductions;
- Evaluate the following documentation:

¹ Natalia Rodrigo was already qualified as auditor when this PRC Report was edited.

- (a) The registered PoA-DD (doc /02/) as well as registered CPA-DD's (docs: /04/, /05/, /06/, /07/, /08/, /09/, /10/, and /11/), including the monitoring plan and the applicable validation report: TUV Sud, number 600500202, dated 28/03/2011 (document /12/).
- (b) Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board;
- (c) All information and references relevant to the project activity's resulting in emission reductions.

A complete list of documents reviewed is available in Appendix 3 of this report.

C.2. On-site inspection

Duration of on-site inspection: 28/09/2015 to 02/10/2015				
No.	Activity performed on-site	Site location	Date	Team member
1.	<ul style="list-style-type: none"> - Initial meeting - Confirm the implementation and operation of the project; - Review the data flow for generating, aggregating and reporting the monitoring parameters; - Confirm the correct implementation of procedures for operations and data collection; - Cross-check the information provided in the CDM-POA-MR documentation with other sources; - Review the calculations and assumptions used to obtain the GHG data and ER; - Evaluate the monitoring methodology against the requirements of the CPA-DD and the approved methodology, including calibrations, maintenance, etc.; 	PP's Offices (Tunisia)	28/09/2015	MSC NRV
2.	<ul style="list-style-type: none"> - Confirm if the sampling approach conducted by ANME was accordingly implemented in line with UNFCCC requirements regarding the ER calculation methodology. 	Different provinces of Tunisia:	29/09/2015 30/09/2015 01/10/2015	MSC NRV
	<i>On site visits SWH (1a)</i>	<i>Nabeul province (Zone West)</i>	29/09/2015	MSC
	<i>On site visits SWH (1b)</i>	<i>Grand Tunis – province Manzah</i>	29/09/2015	NRV
	<i>On site visits SWH (2a)</i>	<i>Grand Tunis – province Mannouba</i>	30/09/2015	MSC
	<i>On site visits SWH (2b)</i>	<i>Nabeul province (Zone East)</i>	30/09/2015	NRV
	<i>On site visits SWH (3a)</i>	<i>Bizerte province</i>	01/10/2015	MSC
	<i>On site visits SWH (3b)</i>	<i>Grand Tunis – province Ben Arous</i>	01/10/2015	NRV
	<ul style="list-style-type: none"> - Cross-check the information provided in the CDM-POA-MR documentation with other sources - Review the calculations and assumptions used to obtain the GHG data and ER - Identify if the quality control and quality assurance procedures are in place to prevent or correct errors or omissions in the reported parameters. - Final meeting 	PP's Offices (Tunisia)	02/10/2015	MSC NRV

C.3. Interviews

Persons interviewed during the verification:

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1	Jaafar	Afef	Project Manager, ANME	28/09/2015	Operation of the project activity; Implementation of the monitor plan of the project activity; Data collection and data achievement; Equipment maintenance	MSC / NRV
2	Besbes	Mouna	Project Coordinator, ANME	28/09/2015	Operation of the project activity; Implementation of the monitor plan of the project activity; Data collection and data achievement; Equipment maintenance	MSC / NRV
3	Fischer	Inga	CO ₂ Operations Project Manager, Solvay Energy Services	28/09/2015	Operation of the project activity; Implementation of the monitor plan of the project activity; Data collection and data achievement; Equipment maintenance	MSC / NRV
4	Selected Households of DOE Sampling Plan (refer to Appendix 5)			29/09/2015	SWH Installation date	MSC / NRV
5	Selected Households of DOE Sampling Plan (refer to Appendix 5)			30/09/2015	Frequency of SWH usage	MSC / NRV
6	Selected Households of DOE Sampling Plan (refer to Appendix 5)			01/10/2015	Conformance with SWH	MSC / NRV

C.4. Sampling approach

Due to the large amount of data (SWH) to be verified, the auditor team has adopted an acceptance sampling approach. In concrete terms, Applus+ LGAI has applied a sampling conduction based on UNFCCC methodological requirements (Procedure: Guideline, Sampling and surveys for CDM project activities and programmes of activities, Version 3.0 - CDM-EB75-A08) which was resulted on the on-site evaluation of 54 SWH's within Tunisia. In concrete terms, this sampling was conducted across the regions of Grand Tunis, Nabeul and Bizerte. Sampling was based on visual and interview evaluation of the SWH installation, where the following criteria was taken into account:

- ✓ SWH type, location, inclination and orientation.
- ✓ SWH frequency of usage, based on average number of showers per day.
- ✓ Usage of other sources of energy, apart from SWH, such as electricity, natural gas, LPG or others.

- ✓ SWH's monitoring control, based on frequency with which on-site evaluation are made in order to assess the effectivity of SWH's.
- ✓ SWH's installation date.
- ✓ User's satisfaction with SWH, in terms of frequency usage, economic saving and visual and environmental impact.

(For more details of this sampling approach, please refer to Section I.4.3 and Appendix 5).

C.5. Clarification requests, corrective action requests and forward action requests raised

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
General			
Compliance of the monitoring report with the monitoring report form	CL #03, 09	0	0
Remaining forward action requests from validation and/or previous verification	0	0	0
Specific-case CPA(s) considered for verification and covered in this report	0	CAR # 01	0
Programme of activities			
Compliance of the programme implementation with the registered PoA-DD	0	0	0
Implementation and operation of the management system	0	0	0
Post-registration changes			
<ul style="list-style-type: none"> Temporary deviations from the registered monitoring plan, monitoring methodology or standardized baseline 	1 CL #10	0	0
<ul style="list-style-type: none"> Corrections 	0	0	0
<ul style="list-style-type: none"> Inclusion of a monitoring plan in a registered PoA-DD (including its generic CPA-DD(s)) 	0	0	0
<ul style="list-style-type: none"> Permanent changes to the monitoring plan as described in the registered PoA-DD, applied methodology, or applied standardized baseline 	0	0	0
<ul style="list-style-type: none"> Changes to the programme design of the registered PoA-DD (including corresponding changes to project design of the generic CPA-DD(s)) and updates to the eligibility criteria for inclusion of specific-case CPAs in the PoA 	0	0	0
<ul style="list-style-type: none"> Types of changes specific to afforestation and reforestation activities 	0	0	0
Component project activity(ies)			
Compliance of the CPA implementation with the included CPA design document	0	0	0
Post-registration changes			
<ul style="list-style-type: none"> Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline 	0	0	0
<ul style="list-style-type: none"> Corrections 	0	0	0
<ul style="list-style-type: none"> Changes to the start date of the crediting period 	0	0	0
<ul style="list-style-type: none"> Inclusion of a monitoring plan to an included CPA-DD 	0	0	0
<ul style="list-style-type: none"> Permanent changes to the monitoring plan as described in the included CPA-DD, applied methodology, or applied standardized baseline 	0	0	0
<ul style="list-style-type: none"> Changes to the programme design of the included CPA-DD 	0	0	0
<ul style="list-style-type: none"> Types of changes specific to afforestation 	0	0	0

and reforestation component project activities			
Compliance of the monitoring plan with the monitoring methodology including applicable tool and standardized baseline			
Compliance of monitoring activities with the registered monitoring plan			
• Data and parameters fixed ex ante or at renewal of crediting period	CL # 01,02,04,05,06,08	CAR # 01	0
• Data and parameters monitored	CL # 01,02,04,05,06,08	CAR # 01	0
• Implementation of sampling plan	CL # 07	0	0
Compliance with the calibration frequency requirements for measuring instruments	0	0	0
Assessment of data and calculation of emission reductions or net removals	0	CAR # 01	0
• Calculation of baseline GHG emissions or baseline net GHG removals by sinks	0	CAR # 01	0
• Calculation of project GHG emissions or actual net GHG removals by sinks	0	CAR # 01	0
• Calculation of leakage GHG emissions	0	CAR # 01	0
• Summary of calculation of GHG emission reductions or net GHG removals by sinks	0	CAR # 01	0
• Comparison of actual GHG emission reductions or net GHG removals by sinks with estimates in included specific-case CPA	0	CAR # 01	0
• Remarks on difference from estimated value in registered PDD	0	CAR # 01	0
Others (please specify)	0	0	0
Total	10 CL # 01,02,03,04,05,06,07,08, 09,10	1 CAR # 01	0

SECTION D. Internal quality control

As a final step of verification, the final documentation including the verification report needs to follow an internal quality control conducted by the Technical Reviewer. Each report has to be finally approved either by the DOE's Technical Manager or the Deputy. In case one of these two persons is part of the verification team, the approval can only be given by the person who is not a part of the verification team. If the documents have been satisfactorily approved, the Request for Issuance is submitted to the CDM-EB along with the relevant documents.

SECTION E. Verification opinion

Applus+ LGAI has been contracted by Agence Nationale pour la Maîtrise de l'Energie to perform the 1st periodical verification of Solar Water Heater Programme in Tunisia (UNFCCC Ref. No.4659) in the period 13/05/2011 - 31/12/2014.

Applus+ LGAI concludes that the CDM Project "Solar Water Heater Programme in Tunisia", as described in the monitoring plan contained in the registered PoA-DD (Ver 06 dated 16/02/2011 - doc /02/), in the eight registered CPA's: different versions and dates, documents: /04/ CPA-1 registered, (/23/ CPA-1 has been updated after the on-site verification, see CAR-/01/, and CPA's-/05/, /06/, /07/, /08/, /09/, /20/ and /11/) and in the Monitoring Report version 04 dated 29/03/2017 (document referred as /22/ in appendix 3), meets all relevant requirements of the UNFCCC for CDM project activities including article 12 of the Kyoto Protocol, the modalities and procedures for CDM (Marrakesh Accords) and the subsequent decisions by the COP/MOP and CDM Executive Board. The verification is conducted in line with the VVS 9 requirements. The Project is implemented according to selected monitoring methodology (AMS.I.C/ Thermal energy production with or without electricity, version 17. Document /26/ in appendix 3 and the monitoring plan contained in the registered PoA-DD (doc /02/). The monitoring equipment was installed and maintained in a proper manner. The monitoring system is in place and the Project is generating GHG emission reductions as a CDM project.

Applus+ LGAI confirms that the project is implemented in accordance with the validated and registered PoA-DD /02/. The monitoring system is in place and the emission reductions are calculated without material misstatements. Our opinion relates to the projects GHG emissions and the resulting GHG emission reductions reported and related to the valid and registered project baseline and monitoring and its associated documents. Based on the information seen and evaluated we confirm that the implementation of the project has resulted in 90,148.0 tCO₂e emission reductions during the period 13/05/2011 – 31/12/2014 (both days included).

Applus+ LGAI therefore issues the positive verification opinion expressed in the Certification statement in Section F.

SECTION F. Certification statement

Applus+ LGAI has been engaged by Agence Nationale pour la Maîtrise de l'Energie-PP to perform the 1st periodical verification of Solar Water Heater Programme in Tunisia (UNFCCC Ref. No.4659) in the period 13/05/2011 - 31/12/2014.

The management of Agence Nationale pour la Maîtrise de l'Energie is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project's Monitoring Plan in the registered PoA-DD (Ver 06 dated 16/02/2011 - doc /02/), in the 8 CPA's: different versions and dates, documents: /23/ (CPA-1 has been updated), /05/, /06/, /07/, /08/, /09/, /10/, and /11/), the Monitoring Report Version 04 (document /22/ has been completed on 29/03/2017 and the applied methodology AMS.I.C/ Thermal energy production with or without electricity, version 17. Document /26/

Our verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakesh accord, as well as those defined by the CDM Executive Board. Our approach is risk-based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate them. The verification can confirm that:

- the project is operated as planned and described in the PoA_DD and the CPA's approved by the EB (the CPA-1, doc /22/ has been updated after the on-site verification);
- the monitoring plan is as per the applied methodology;
- the monitoring in Monitoring Report is as per the PoA-DD and the monitoring plan approved by the EB;
- the development and maintenance of records and reporting procedures are in accordance with the registered monitoring plan;
- the installed equipment being essential for generating emission reduction runs reliably;
- the monitoring system is in place and generates GHG emission reductions data;
- the GHG emission reductions are calculated without material misstatements.

In our opinion, the GHG emission reductions for CDM Project "Solar Water Heater Programme in Tunisia", for the monitoring period 13/05/2011 - 31/12/2014 as reported in Monitoring Report Ver 02 (doc /22/), prepared on the basis of the project's Monitoring Plan are fairly stated.

<i>Based on the information we have seen and evaluated, we confirm the following statement:</i>	
<i>Reporting period:</i>	
Reporting Period	From 13/05/2011 – 31/12/2014
Verified emissions in the above reporting period	0 tCO ₂ equivalents
Project emissions	0 tCO ₂ equivalents
Baseline emissions	90,148.0 tCO ₂ equivalents
Emission reductions	
Actual values achieved up to 31 December 2012	17,985.0 tCO ₂ equivalents
Actual values achieved from 1 January 2013 onwards	72,163.0 tCO ₂ equivalents

SECTION G. Verification findings - General

G.1. Compliance of the monitoring report with the monitoring report form

Means of verification	The verification team verified the applied monitoring form against the latest version of “CDM-PoA-MR-FORM”.
Findings	<p>The “CDM-PoA-MR-FORM” version 01.0 was applied. The verification team has verified the format against the template and confirmed that the correct format of CDM-POA-MR form is used.</p> <p>In MR Ver 01, section H.1, is not clearly described how the complete process of Emissions Reductions (ERy) Calculation is made, as it was defined within applicable and already registered PoA-DD. A CL #09 was raised.</p> <p>In response the PP has edited a new version of MR (version 2, dated 10/11/2015), on it a paragraph was included at the beginning of chapter H.1, in the Monitoring Report transparently explaining the way how the emission reductions have been calculated ($ERy = BEy - PEy - LEy$).</p> <p>Hence, the CL #09 has been closed.</p> <p>In addition, it was also found that the PoA-DD and CPA-DDs stated that the number of operating units were needed to be determined through an annual verification implemented by the ANME. However, the monitoring report and verification report stated that the monitoring frequency of the failure rate of the SWH ($F_{x,y}$) is once per monitoring period (paragraph 299 of the VVS version 09.0) (CL#10). As a result, CL#10 was opened.</p> <p>In line with CL#10 scope, PP justified that the reason of selecting a monitoring frequency of the failure rate of the SWH ($F_{x,y}$) as once per monitoring period, is in line with the following: The randomly established plan implied a high number of on-site visits within Tunisia. Moreover, besides the fact that it was very costly, Tunisia's post revolution context made the access to many region very difficult. All these reasons made the monitoring plan on an annual basis quite impossible. The approach taken has been proven to be conservative since the failure rate used for the whole monitoring period is the one related to the year that immediately precede the end of the monitoring period which can only be higher or equal to the failure rate of the first years of the monitoring period following the registration of the PoA and the inclusion of the CPAs.</p> <p>The justification provided by PP is proved as realistic and conservative, in line with VVS 9. In addition, no affections to additionality, project design or ER calculations are found.</p> <p>CL#10 is closed.</p>
Conclusion	Applus+ LGAI confirms that the monitoring report is in compliance with the relevant valid form and instructions therein as accordance to VVSv09.0 §§ 381-382.

G.2. Remaining forward action requests from validation and/or previous verification

This is the 1st periodical verification. There are no remaining issues and FARs from the registered validation report.

G.3. Specific-case CPA(s) considered for verification and covered in this report

Brief description of the PoA

The small-scale programme of activities (hereafter referred to as “the PoA”) is a programme for the installation of domestic solar water heaters (hereafter referred to as “SWH”) in households throughout Tunisia. The objective of the PoA is to support the development of solar energy for water heating in Tunisia, in line with the 11th Plan set by the Tunisian government.

The PoA is a voluntary action, not required by law, launched in January 2007 by the Tunisian National Agency for Energy Conservation (Agence Nationale pour la Maîtrise de l'Energie – ANME) and is undertaken in conjunction with a nation-wide loan support solar programme known as “Prosol 2 – Residential”. The stated goal of the PoA is to install around 30,000 SWH per year in households, thereby displacing carbon intensive electricity from the grid and fossil fuels currently used to provide hot water in the households.

The ANME (Agence Nationale pour la Maîtrise de l'Energie) is the coordinating and managing entity (CME) of the PoA and acts as a coordinator between the different stakeholders involved in the PoA:

- The households willing to install a SWH
- The SWH suppliers and installers certified by the PP
- The Société Tunisienne de l'Electricité et du Gaz (STEG - Tunisian Electricity and Gas Company), and
- The Tunisian government, granting a subsidy for the purchase of SWH

The PP signed in 2007 an agreement with the STEG, which plays the role of intermediary between the households and Attijari bank. Attijari bank grants a loan to the households wishing to benefit from the loan support programme and the STEG allows the households to reimburse the loan through its electricity bill over 5 years. This is done through a form part of the application package submitted to the PP by the suppliers. As such, households only interact with the supplier's and do not need to interact directly with the STEG and the Bank to take part in the programme and enjoy the benefits it offers. The PP also examines the requests for certification of SWH supplier's as well as SWH models under the PoA, thereby ensuring that high quality equipment is used. After the installation of the SWH, the PP also deals with maintenance requests and actions for SWH that have a failure.

Each CPA consists of a group of SWHs installed over a period of six months. The total number of installed square meters of collectors of each individual CPA remains below the small-scale threshold of 64,000m² applicable to solar energy projects, as per Appendix B to the decision 21/cp.8 of the document FCCC/CP/2002/7/Add.3.

Generic CPA(s)

Title, identification/reference number and/or version number of the generic CPA(s) of the PoA	Sectoral scope(s)	Applied methodology(ies) or combination of methodologies and/or standardized baseline(s)
Solar Water Heater Programme in Tunisia – Generic CPA X - Version 5 dated 16/02/2011	Sectoral scope 1 - Energy industries (renewable - / non-renewable sources)	AMS.I.C. Thermal energy production with or without electricity, version 17

Specific-case CPA(s) covered in this monitoring report

The information referred in the MR is the following:

Reference number of the specific- case CPA included in the PoA as of the end of this monitoring period	Title, identification/ reference number and version number of the generic CPA to which the specific-case CPA applies	Crediting period dates of the specific-case CPA	Is this specific-case CPA covered in this monitoring report? (yes/no)
4659-0001	Solar Water Heater Programme in Tunisia – CPA X – Version 5	13/05/2011 – 12/05/2021	Yes
4659-0002	Solar Water Heater Programme in Tunisia – CPA X – Version 5	24/08/2012 – 23/08/2022	Yes

4659-0003	Solar Water Heater Programme in Tunisia – CPA X – Version 5	24/08/2012 – 23/08/2022	Yes
4659-0004	Solar Water Heater Programme in Tunisia – CPA X – Version 5	24/08/2012 – 23/08/2022	Yes
4659-0005	Solar Water Heater Programme in Tunisia – CPA X – Version 5	24/08/2012 – 23/08/2022	Yes
4659-0006	Solar Water Heater Programme in Tunisia – CPA X – Version 5	24/08/2012 – 23/08/2022	Yes
4659-0007	Solar Water Heater Programme in Tunisia – CPA X – Version 5	15/12/2012 – 14/12/2022	Yes
4659-0008	Solar Water Heater Programme in Tunisia – CPA X – Version 5	02/01/2013 – 01/01/2023	Yes

In this previous table (section A.1.2 in MR) is given the name and version number of the generic CPA to which the specific-case CPA applies. All CPA apply the same generic CPA which has version number 5 as published at UNFCCC under "generic CPA". And the name of the generic CPA is "Solar Water Heater Programme in Tunisia – CPA X".

The versions of CPA's that have been verified in this assessment are referred in the following table:

Reference number of the specific- case CPA included in the PoA as of the end of this monitoring period	Title, identification/ reference number and version number of the specific CPA to which the specific-case CPA applies	Crediting period dates of the specific-case CPA	Is this specific-case CPA covered in this monitoring report? (yes/no)
4659-0001	Solar Water Heater Programme in Tunisia – CPA 1 – Version 6 .1(Updated after this verification)	13/05/2011 – 12/05/2021	Yes
4659-0002	Solar Water Heater Programme in Tunisia – CPA 2 - Version 3	24/08/2012 – 23/08/2022	Yes
4659-0003	Solar Water Heater Programme in Tunisia – CPA 3 - Version 3	24/08/2012 – 23/08/2022	Yes
4659-0004	Solar Water Heater Programme in Tunisia – CPA 4 - Version 3	24/08/2012 – 23/08/2022	Yes
4659-0005	Solar Water Heater Programme in Tunisia – CPA 5 - Version 3	24/08/2012 – 23/08/2022	Yes
4659-0006	Solar Water Heater Programme in Tunisia – CPA 6 - Version 3	24/08/2012 – 23/08/2022	Yes
4659-0007	Solar Water Heater Programme in Tunisia – CPA 7 - Version 2	15/12/2012 – 14/12/2022	Yes
4659-0008	Solar Water Heater Programme in Tunisia – CPA 8 - Version 2	02/01/2013 – 01/01/2023	Yes

As well as:

Reference number of the specific-case CPA included in the PoA as of the end of this monitoring period	Is the specific-case CPA considered for this verification? (yes/no)	Version number of the registered PoA-DD to which the specific-case CPA complies with	Confirmation that a request for issuance including the specific-case CPA has been published for the previous monitoring period (Y/N)
4659-0001	Yes	Version 6	N/A (this a 1 st Verification)
4659-0002	Yes	Version 6	N/A (this a 1 st Verification)
4659-0003	Yes	Version 6	N/A (this a 1 st Verification)
4659-0004	Yes	Version 6	N/A (this a 1 st Verification)
4659-0005	Yes	Version 6	N/A (this a 1 st Verification)
4659-0006	Yes	Version 6	N/A (this a 1 st Verification)
4659-0007	Yes	Version 6	N/A (this a 1 st Verification)
4659-0008	Yes	Version 6	N/A (this a 1 st Verification)

SECTION H. Verification findings – Programme of activities

H.1. Compliance of the programme implementation with the registered programme design document

Means of verification	The verification team has, by means of an on-site inspection, assessed that all physical features (technology, project equipment, and monitoring) of the registered CDM PoA are in place and that the project participants have operated the project activity as per the registered PoA-DD.
Findings	<p>The PoA was registered on 13/04/2011 with the reference number 4659 which is available on the UNFCCC website (https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/7KX218NCPREWQ4YSB90MUI5T6FHZJA/view). This monitoring period falls into the 1st crediting period. Each CPA has its own crediting period (see table in the previous section). The project activity is implemented in accordance with the approved methodology AMS-I.C. ver. 17 - Thermal energy production with or without electricity.</p> <p>The monitoring period covers the period 13/05/2011 to 31/12/2014 during the 1st crediting period. The project started construction on 23/01/2007. All these have been confirmed by checking validation and verification report.</p> <p>The verification team has performed a site visit to verify the actual implementation of the PoA against the description in the registered PoA-PDD. In this 1st monitoring period, the PoA involved implementation and operation of all the 103,427 SWH's.</p> <p>The capacity of the installed capacity is the same as per the registered PoA-DD and eight CPA's. The different SWH have different installed capacities. The verification team has also verified the technical parameters of the main equipment. SWH models are in line with the actual situation and the technical parameters specified in the registered PoA-DD. Through the document review and site visit, the verification team confirmed that the actual implementation of the project is in accordance with the registered PoA-DD.</p> <p>In addition, it was also found that the PoA-DD and CPA-DDs stated that the number of operating units were needed to be determined through an annual verification implemented by the ANME. However,</p>

	<p>the monitoring report and verification report stated that the monitoring frequency of the failure rate of the SWH ($F_{x,y}$) is once per monitoring period (paragraph 299 of the VVS version 09.0) (CL#10). As a result, CL#10 was opened.</p> <p>In line with CL#10 scope, PP justified that the reason of selecting a monitoring frequency of the failure rate of the SWH ($F_{x,y}$) as once per monitoring period, is in line with the following: The randomly established plan implied a high number of on-site visits within Tunisia. Moreover, besides the fact that it was very costly, Tunisia's post revolution context made the access to many region very difficult. All these reasons made the monitoring plan on an annual basis quite impossible.</p> <p>The approach taken has been proven to be conservative since the failure rate used for the whole monitoring period is the one related to the year that immediately precede the end of the monitoring period which can only be higher or equal to the failure rate of the first years of the monitoring period following the registration of the PoA and the inclusion of the CPAs.</p> <p>The justification provided by PP is proved as realistic and conservative, in line with VVS 9. In addition, no affections to additionality, project design or ER calculations are found.</p> <p>CL#10 is closed.</p>
Conclusion	<p>The verification team confirms that the implementation and operation of the registered CDM PoA has been conducted in accordance with the description contained in the registered PoA-DD, as well as CPA-DD's. There is no deviation or the proposed or actual changes in the implementation or operation of the registered CDM PoA during this monitoring period.</p>

H.2. Implementation and operation of the management system

Means of verification	<p>The verification team has, by means of an on-site inspection, assessed that all documentary and managing features of the registered CDM PoA are in place and that the project participants have operated the project activity as per the registered PoA-DD.</p>
Findings	<p>The CDM management manual was verified by the verification team, and the monitoring and management system was found in place. The staffs of the project activity have received training on monitoring, management & CDM knowledge, the training records were also verified by the verification team. The monitoring report contains a comparison of the actual emission reductions claimed in the monitoring period with the estimation in the registered PDD. The actual emission reductions during this monitoring period are lower than the values estimated in the registered CPA-DD for the monitoring period 13/05/2011 to 31/12/2014. During the site visit, no changes have been observed or identified which may impact the additionality as there was no change in the effective output capacity, no addition of component nor extension of technology, no addition nor removal of project sites of the project activity, no change of values of the actual operational parameter relevant to determination of emission reductions which are within the control of the PP; no change has been observed or identified that may impact the scale of the project activity or applicability of baseline and monitoring methodology. It's confirmed that there are no special events in the monitoring period. As a result, the verification team confirms that none of the data affects the additionality, scale or applicability of the project.</p>
Conclusion	<p>The verification team confirms that the management of the registered CDM PoA has been conducted in accordance with the description contained in the registered PoA-DD, as well as CPA-DD's. There is no deviation in the management of the registered CDM PoA during this monitoring period.</p>

H.3. Post-registration changes

H.3.1. Temporary deviations from the registered monitoring plan, monitoring methodology or standardized baseline

The PoA-DD and CPA-DDs states that the number of operating units were to be determined through an annual verification implemented by the ANME. However, the monitoring report and verification report state that the monitoring frequency of the failure rate of the SWH (Fx,y) is once per monitoring period. As a result, a temporary deviation was opened due to this fact.

This choice was made because of the high cost of the monitoring process which implies a high number of visits on the field all around Tunisia, following the sample plan randomly established. The approach taken has been proven to be conservative since the failure rate used for the whole monitoring period is the one related to the year that immediately precedes the end of the monitoring period which can only be higher or equal to the failure rate of the first years of the monitoring period following the registration of the PoA and the inclusion of the CPAs

H.3.2. Corrections

The aim of the Post Registration Changes scope is to address DOE's requested corrections after on-site assessment conduction which refers to project information, being focused on the already registered PoA and CPA's. These corrections do not affect the design of the PoA and as a result, as per current version of CDM Project Standard, the same do not require prior approval by the CDM Executive Board (the Board).

In concrete terms, during the desk review and on-site inspection conducted by Applus+ LGAI within September-October 2015, it was identified that within CPA-1, some significant differences regarding the description of SWH's between the documentation which was already registered and the documentation which was submitted for request for issuance. These differences refer to:

- CPA-1 for request for issuance referred to new models of SWH's which were not described within the previous already registered version. In concrete terms, the following models were added to the new version: 307, 1401, 2101, 2102, 2103, 2104, 2201 and 2202.
- CPA-1 already registered document referred to some parameters regarding Emission Reduction (ER) calculation under an incorrect way. In concrete terms, it was found that the parameters known as O_k factor (MWh/y) and Annual energy output of the SWH were incorrectly defined. To illustrate this point, SWH model identified as 1901, O_k factor was defined as 2278 MWh/y where it should be 1400 and SWH model identified as 1902, O_k factor was defined as 2000 MWh/y where it should be 2538.
- In addition, comparing the O_k values for each SWH model with all the Workbooks applicable for CPA's 1 to 8, some inconsistencies for 17 SWH's have been found. In concrete terms, these inconsistencies have been found for the SWH models identified as: 305, 1401, 1402, 1403, 1801, 1802, 1803, 1804, 1901, 1902, 2002, 2101, 2102, 2103, 2104, 2201, 2202).

As a result, the aforementioned inconsistencies derived in differences between the ER calculation results. In concrete terms, ER under CPA 1 shall refer to 71598 tCO₂ instead of 72421 tCO₂e of the CPA-1 original **Ed5**. The emission reduction calculations for CPA1 as well as the global ER value have been updated accordingly. For the sake of clarity, all O_k values and ER calculations for CPA2-8 have been carefully checked under the same scope of finding and the same have been regarded as correct.

H.3.3. Inclusion of a monitoring plan in a registered PoA-DD (including its generic CPA-DD(s))

No additional inclusion of a monitoring plan in a registered PoA-DD is implied within this 1st Monitoring Report.

H.3.4. Permanent changes to the monitoring plan as described in the registered PoA-DD, applied methodology, or applied standardized baseline

No applies

H.3.5. Changes to the programme design of the registered PoA-DD (including corresponding changes to project design of the generic CPA-DD(s)) and updates to the eligibility criteria for inclusion of specific-case CPAs in the PoA

No applies

H.3.6. Types of changes specific to afforestation and reforestation activities

No applies

SECTION I. Verification findings – Component project activity(ies)

I.1. Compliance of the CPA implementation with the included CPA design document

Means of verification	The verification team verified the applied monitoring form against the latest version of “CDM-CPA-DD”.
Findings	Current versions of “CDM-CPA-DD” were correctly applied within applicable and already registered CPA-DD’s.
Conclusion	Versions of “CDM-CPA-DD” were in line with applicable version and instructions therein.

I.2. Post-registration changes

I.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

No applies

I.2.2. Corrections

As per conclusions stated on section H.3, MR has been accordingly modified by PP in order to cover the scope of these corrections as per PRC.

I.2.3. Changes to the start date of the crediting period

No applies

I.2.4. Inclusion of a monitoring plan to an included CPA-DD

No applies

I.2.5. Permanent changes to the monitoring plan as described in the included CPA-DD, applied methodology, or applied standardized baseline

No applies

I.2.6. Changes to the programme design of the included CPA-DD

No applies

I.2.7. Types of changes specific to afforestation and reforestation component project activities

No applies

I.3. Compliance of monitoring plan with the monitoring methodology including applicable tool and standardized baseline

Means of verification	The verification team has verified the monitoring plan in the registered updated CPA-DD with the approved methodology AMS.I.C. Thermal energy production with or without electricity, version 17.0, to confirm the compliance.
Findings	The monitoring plan in the registered CPA-DD is in accordance with the approved methodology AMS-I.C, version 17.0, applied by the proposed CDM PoA. No correction or permanent change to the monitoring plan has been requested to the CDM Executive Board.
Conclusion	The monitoring plan in the registered CPA-DD is in accordance with the approved methodology AMS-I.C, version 17.0.

I.4. Compliance of monitoring activities with the registered monitoring plan

I.4.1. Data and parameters fixed ex ante or at renewal of crediting period

Parameter 1:

Data/parameter	$w_{i,x}$																																																																																																																																																																																																																									
Unit	%																																																																																																																																																																																																																									
Description	Weighting of water heater using energy source i in the baseline scenario for SSC-CPA x																																																																																																																																																																																																																									
Source of data	STEG																																																																																																																																																																																																																									
Value(s) applied	<table><tr><td></td><td>LPG</td><td>NG</td><td>ELEC</td><td>others</td></tr><tr><td>CPA1</td><td>57.9%</td><td>6.9%</td><td>8.7%</td><td>26.5%</td></tr></table> <p>NG (yes =1 ; no =0)</p> <table><tr><td></td><td colspan="21">Provinces</td><td></td></tr><tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td><td></td></tr><tr><td>CPA2</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>8</td></tr><tr><td>CPA3</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>8</td></tr><tr><td>CPA4</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>8</td></tr><tr><td>CPA5</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>9</td></tr><tr><td>CPA6</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>9</td></tr><tr><td>CPA7</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>10</td></tr><tr><td>CPA8</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>10</td></tr></table> <p>Where:</p> <ul style="list-style-type: none">• LQP, Liquefied Petroleum Gases• NG, Natural Gas• ELEC, Electricity,• OTHERS, other sources of energy		LPG	NG	ELEC	others	CPA1	57.9%	6.9%	8.7%	26.5%		Provinces																							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21		CPA2	0	0	1	0	1	0	0	1	0	0	1	0	1	1	1	0	0	1	0	0	0	8	CPA3	0	0	1	0	1	0	0	1	0	0	1	0	1	1	1	0	0	1	0	0	0	8	CPA4	0	0	1	0	1	0	0	1	0	0	1	0	1	1	1	0	0	1	0	0	0	8	CPA5	0	0	1	0	1	0	0	1	0	0	1	0	1	1	1	0	0	1	0	0	1	9	CPA6	0	0	1	0	1	0	0	1	0	0	1	0	1	1	1	0	0	1	0	0	1	9	CPA7	0	0	1	0	1	0	1	1	0	0	1	0	1	1	1	0	0	1	0	0	1	10	CPA8	0	0	1	0	1	0	1	1	0	0	1	0	1	1	1	0	0	1	0	0	1	10
	LPG	NG	ELEC	others																																																																																																																																																																																																																						
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CPA2	0	0	1	0	1	0	0	1	0	0	1	0	1	1	1	0	0	1	0	0	0	8																																																																																																																																																																																																				
CPA3	0	0	1	0	1	0	0	1	0	0	1	0	1	1	1	0	0	1	0	0	0	8																																																																																																																																																																																																				
CPA4	0	0	1	0	1	0	0	1	0	0	1	0	1	1	1	0	0	1	0	0	0	8																																																																																																																																																																																																				
CPA5	0	0	1	0	1	0	0	1	0	0	1	0	1	1	1	0	0	1	0	0	1	9																																																																																																																																																																																																				
CPA6	0	0	1	0	1	0	0	1	0	0	1	0	1	1	1	0	0	1	0	0	1	9																																																																																																																																																																																																				
CPA7	0	0	1	0	1	0	1	1	0	0	1	0	1	1	1	0	0	1	0	0	1	10																																																																																																																																																																																																				
CPA8	0	0	1	0	1	0	1	1	0	0	1	0	1	1	1	0	0	1	0	0	1	10																																																																																																																																																																																																				
Choice of data or measurement methods and procedures	For CPA 1: For SWH that displace technologies using fossil fuels or that displace electricity imported from the grid. For CPA 2- CPA 8: For all the SWH installed in a Province where natural gas is provided (even if it's only in some cities), it is assumed that natural gas was used prior to the installation of the SWH. For all the SWH installed in a Province where the natural gas is not provided, it is assumed that LPG was used prior to the installation of the SWH.																																																																																																																																																																																																																									
Purpose of data	Calculation of baseline emissions																																																																																																																																																																																																																									
Additional comments	The data is recorded in the Prosol 2 database and comes from a form filled in by the SWH installer during the installation of the SWH.																																																																																																																																																																																																																									

Means of verification	<p>For CPA-1:</p> <p>The parameter $w_{i,x}$ is referred from the registered PoA-DD version 6 in generic way and from the registered CPA-01 version 5, document /4/ (and in the updated CPA-01 version 6), document /23/, with concrete % of different sources, which is used in line with the selected methodology ex-ante.</p> <p>Prosol 2 Database has been evaluated, the data parameters are recorded within Prosol Database, where % energy source is detailed for each SWH (e.g Consultation d'un dossier – mode de chauffage. Document: File SWH example, document/27/).</p>
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The verification team has randomly verified a sample of 25 files where it is concluded that contained information is correct. In addition, it is also evaluated that this information was accordingly translated into validated and already registered CPA-1.

In addition, these data parameters which are recorded within Prosol Database are correctly transferred to .xls calculation sheets. These .xls calculation sheets are regarded as internal information sheets for ANME.

The verification team confirms correct correlation between both documents as well as additional documentation (i.e. internal communication, e-mails) which supports abovementioned parameters. These parameters are:

LPG	57.9%
Natural gas	6.9%
Grid electricity	8.7%
Other	26.5%

Please refer to document: /28/-% Ancien mode de chauffage - CPA1, in which:

LPG = 8,503 SWH (57.9%)

Natural Gas = 1,009 SWH (6.9%)

Electricity = 1,292 SWH (8.7%)

Other source + No source = 1,635 + 2,261 = 3,896 SWH (26.5%)

Total = 14,690 SWH (100%)

Furthermore, the verification team confirmed the % of these parameters across the on-site visit interviews, conducted within 29/09/2015 and 01/10/2015. As a result, it can be concluded that most frequent energy source is LPG, followed by Other, Grid electricity and Natural Gas. Please refer to Section I.4.3 and Appendix 5, for more information regarding on-site interviews.

The reported values are verified in the MR Version 2.0 (document /22/) and in the ER calculation excel sheet: WB_MP#1_PoA-4659_0001_10NOV2015 (document /24/).

For **CPA-2, CPA-3, CPA-4, CPA-5, CPA-6, CPA-7 and CPA-8:**

The parameter ***W_{i,x}*** is referred from the registered PoA DD version 6 in generic way and from the registered CPA-2 to CPA-06 all in version 3 (five CPA) and from CPA-7 to CPA-8 both in version 2 (two CPA) documents /5/, /6/, /7/, /8/, /9/, /10/ and /11/, which is used in line with the selected methodology ex-ante.

Within ER calculation excel sheet, named as WB_MP#1_PoA-4659_0002 to WB_MP#1_PoA-4659_0008, (seven calculation excel sheet, in all of them, sheet 6.ER, ***W_{i,x}*** value), documents /14/, /15/, /16/, /17/, /18/, /19/ and /20/, it is stated that for LPG and Natural Gas, the application of this parameter is not required for the calculation following the Prosol data base. This is due to the fact that for all the installed SWH in a province where natural gas is provided (even if it's only in some cities), it is assumed that natural gas was used prior to the installation of the SWH. For all the SWH installed in a province where the natural gas is not provided, it is assumed that LPG was used prior to the installation of the SWH.

As a result, in line with Prosol 2 Database, affected provinces where natural gas is provided are as follows:
NG (yes =1 ; no =0):

	Provinces																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
CPA2	0	0	1	0	1	0	0	1	0	0	1	0	1	1	1	0	0	1	0	0	0
CPA3	0	0	1	0	1	0	0	1	0	0	1	0	1	1	1	0	0	1	0	0	0
CPA4	0	0	1	0	1	0	0	1	0	0	1	0	1	1	1	0	0	1	0	0	0
CPA5	0	0	1	0	1	0	0	1	0	0	1	0	1	1	1	0	0	1	0	0	1
CPA6	0	0	1	0	1	0	0	1	0	0	1	0	1	1	1	0	0	1	0	0	1
CPA7	0	0	1	0	1	0	1	1	0	0	1	0	1	1	1	0	0	1	0	0	1
CPA8	0	0	1	0	1	0	1	1	0	0	1	0	1	1	1	0	0	1	0	0	1

This information data has been randomly analysed by the verification team (checking all provinces), which is regarded as valid and correct. In addition, this applied methodology is more conservative than the initial one. As a result, % values for % $w_{i,x}$ within these CPA's are not required for the calculation due to the effi factor is the same for NG and LPG (86%) (Please refer to below section, Parameter 2: effi for more clarifications on this parameter).

The reported values of $w_{i,x}$: "not required for the calculation" is verified in the MR Version 2.0, document /22/, and in the seven excel sheet: WB_MP#1_PoA-4659_0002 to WB_MP#1_PoA-4659_0008, documents /14/, /15/, /16/, /17/, /18/, /19/ and /20/.,.

Findings	<p>The CL#01 was raised as the PP to clarify the followings:</p> <p>The PP is requested to submit the source of data, named as <i>Prosol database, ex-ante</i> in order to verify parameters applicability efficiency defined within $w_{i,x}$ (%) calculation sheet.</p> <p>Applus+ LGAI checked the Prosol data base during the on-site audit and additionally in response the PP has sent to auditor team the document /28/: "% ancien mode de chauffage - CPA1" and document /27/: "File SWH example" with the required evidences. Both were checked and found to be correct, hence accepted, the CL#01 was closed satisfactorily.</p> <p>Further details have been provided in Appendix 4 (findings) of this verification report</p>
Conclusion	<p>Applus+ LGAI confirms that the data and the parameter fixed ex ante have been correctly listed.</p> <p>In the CPA-1 the parameter fixed ex-ante for required parameter has been verified by checking the information flow and in compliance with the monitoring plan of the registered PoA DD version 6, from the registered CPA-01 version 5 and from the CPA-01 version 6.</p> <p>Within registered CPA-2 to CPA-06, all in version 3 and from CPA-7 to CPA-8, both in version 2, it has not been used % values of energy sources for this applicable parameter. On the other hand, it has been regarded that this one is not required for the calculation. Under these cases, audit team confirms that this statement is correctly applied, being accordingly justified. In addition, this statement is regarded as more conservative justification that the one described under aforementioned CPA's.</p> <p>Consequently in all cases the requirement of VVS v09.0 §§ 392-393 have been met.</p>

Parameter 2:

Data/parameter	eff_i
Unit	%
Description	Average efficiency of a water heater using energy source i
Source of data	RETScreen
Value(s) applied	LPG 86% NG 86% ELEC 94% SOLAR 94%
Choice of data	/

or measurement methods and procedures	
Purpose of data	Calculation of baseline emissions
Additional comments	<p>The values chosen are highest efficiencies for typical residential water heaters given by the RETScreen® Software Online User Manual, SWH Project Model (Typical Water Heating System Seasonal Efficiencies). This is published by the RETScreen International Clean Energy Decision Support Centre, which is managed by the Natural Resources Canada's (NRCan) CPPT Energy Technology Centre - Varennes (CETC-Varennes). "RETScreen is developed in collaboration with a number of other government and multilateral organisations, and with technical support from a large network of experts from industry, government and academia."</p> <p>(http://www.retscreen.net/ang/centre.php) This data complies with paragraph 22 c) of AMS.I.C version 17</p>

Means of verification	<p>The parameter eff_i Average efficiency of a water heater using energy source i, is referred from the registered PoA DD version 6, document /02/, from the registered CPA-01 version 5, /04/, (from de updated CPA-1 version 6, /23/), from the registered CPA-2 to CPA-06 all in version 3 (five CPA, /05/, /06/, /07/, /08/ and /09/) and from CPA-7 to CPA-8 both in version 2 (two CPA, /10/ and /11/), which is used in line with the selected methodology ex-ante (AMS.I.C version 17, paragraph 22-c, document /26/). The values chosen are highest efficiencies for typical residential water heaters given by the RETScreen® Software Online User Manual, SWH Project Model (Typical Water Heating System Seasonal Efficiencies).</p> <p>For CPA-1: The RETScreen current documentation has been assessed , and % values as per LPG: 86%, NG: 86% y Electricity: 94% have been found correct. Document: /29/, Retscreen13, page 13. On the other hand, regarding Solar % value, PoA-DD, version 6 /02/ and CPA-1 version 5, define this value of eff_i. However, within calculation sheet WB_MP#1_PoA-4659_0001 (/13/=, it is defined for Solar 94% and Other as 100%. PP is requested to update and correct applicable documentation. PP has responded efficiently.</p> <p>For CPA-2, CPA-3, CPA-4, CPA-5, CPA-6, CPA-7 and CPA-8: The RETScreen current documentation has been assessed , and % values as per LPG: 86% and NG: 86% have been found correct. See document: /29/, Retscreen13, page 13.</p> <p>In PoA DD version 6, /02/, from the registered CPA-2 to CPA-06 all in version 3 (five CPA, /05/, /06/, /07/, /08/ and /09/) and from CPA-7 to CPA-8 both in version 2 (two CPA, /10/, and /11/), it is defined the following values:</p> <table border="1"> <tr> <td>LGP</td><td>86%</td></tr> <tr> <td>Natural Gas</td><td>86%</td></tr> <tr> <td>Electricity</td><td>94%</td></tr> <tr> <td>Solar Energy</td><td>94%</td></tr> </table> <p>On the other hand, under calculation excel sheets, named as WB_MP#1_PoA-4659_0002 to WB_MP#1_PoA-4659_0008 (documents /14/, /15/, /16/, /17/, /18/, /19/ and /20/, it is defined the following values:</p> <table border="1"> <tr> <td>LPG</td><td>86%</td></tr> <tr> <td>Natural Gas</td><td>86%</td></tr> </table>	LGP	86%	Natural Gas	86%	Electricity	94%	Solar Energy	94%	LPG	86%	Natural Gas	86%
LGP	86%												
Natural Gas	86%												
Electricity	94%												
Solar Energy	94%												
LPG	86%												
Natural Gas	86%												

	<p>Calculation excel sheets does not identified % value for electricity and solar energy.</p> <p>Be that as it may, the explanation and justification for this inconsistency has been identified under precedent w_i,x. parameter explanation. Consequently, audit team concludes that aforementioned values are traceable, being found correct.</p>
Findings	<p>CPA-1 (/04/) and MR (/01/) are affected:</p> <p>It has been raised CL#2, the PP was requested to submit the source of data, named as <i>Prosol database, ex-ante</i> in order to verify parameters applicability efficiency defined within w_i, the data base has been submitted, document /28/ - % ancien mode de chauffage - CPA1, and the CL is closed.</p> <p>Also it was raised the CL#3, where PP is requested to clarify within applicable Monitoring Report (CDM-POA-MR), that regarding the Data/ Parameter named as eff_i, it is also needed to include the applicable % rate of other sources of energy, identified as OTHERS. In concrete terms, page 10 of CDM-POA-MR, version 1, Section G, Data and Parameters, G.1, Data and parameters fixed ex ante, at registration, inclusion or renewal of crediting period.</p> <p>The updated MR has been submitted, document /22/ -R_MP#1_PoA-4659_0001-0008_10NOV2015_CLEAN VERSION, in which, in section G.1, parameter eff_i, the values of OTHERS 100% is included, consequently the CL is closed.</p> <p>In addition, it has been requested CL#4, where PP is requested to clarify EF_i value for the energy type named as OTHERS within CPA-1: doc /23/ (as well as within its applicable calculation sheet, doc: /24/).</p> <p>PP has explained to audit team that the applicable value of 0.288 given to EF_i was accordingly justified and clarified within applicable CPA-DD, which has been already approved and registered by UNFCCC. In addition, it has been clarified that this value is resulted from weighted statistics applied for LPG, natural gas and grid electricity. Furthermore, it has been added 3% regarding SWH application. All of this has been explained within already registered PoA-DD. Due to the technical justifications, CL#4 is CLOSED</p> <p>Last but not least, it has been raised CL#5, where PP is requested to submit to audit team referred <i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i> in order to give sufficient evidence of the EF_i values which have been defined for LPG and Natural Gas.).</p> <p>In response the PP has sent to TA the document /30/: "30-IPCC 2006", with the required evidences, page 24-25. It was checked and found to be correct, hence accepted, the CL#05 was closed satisfactorily.</p> <p>Further details of CL#02, CL#03 CL#04 CL#05, have been provided in Appendix 4 (findings) of this verification report.</p>
Conclusion	<p>Applus+ LGAI confirms that the data and the parameter fixed ex ante have been correctly listed. The parameter fixed ex-ante for required parameter has been verified by checking the information flow and in compliance with the monitoring plan of the registered PoA DD version 6, from the registered CPA-01 version 5. As a result, the Monitoring Report version 02 and the CPA-1 version 6 have been accordingly modified.</p> <p>The reported value is verified in the MR Version 02 (/22/), in CPA-1 version 6 (/23/) and in the ER calculation excel sheet: WB_MP#1_PoA-4659_0001_10NOV2015 (/24/). As a result, it can be concluded that rest of CPA's (/05/ to /11/) are not affected, as well as Excel Sheet 02-08 (/14/ to /20/).</p> <p>All in all, the requirement of VVS v09.0 §§ 392-393 have been met.</p>

Parameter 3:

Data/parameter	Ok
Unit	MWh/y
Description	Annual energy output of SWH k
Source of data	SOLO software
Value(s) applied	See Appendix 2 of the MR
Choice of data or measurement methods and procedures	The values are the output of a SOLO, a recognized model calculating the energy output of a SWH. This model was developed by the Centre Scientifique et Technique du Bâtiment (Scientific and Technical Centre for the Construction Industry). CSTB is a State-owned industrial and commercial corporative, placed under the administrative supervision of the French Ministry of Housing.
Purpose of data	Calculation of baseline emissions
Additional comments	/

Means of verification	<p>The parameter Ok Annual energy output of SWH_k, is referred from the registered PoA DD version 6, from the registered CPA-01 version 5 (and from the updated CPA-1 version 6), from the registered CPA-2 to CPA-06 all in version 3 (five CPA) and from CPA-7 to CPA-8 both in version 2 (two CPA), which is used in line with the selected methodology ex-ante (AMS.I.C version 17, paragraph 22). The values chosen are obtained for a recognized model calculating the energy output, called SOLO 2000. (Sample in document /42/ in Appendix 3)</p> <p>This parameter, (for each type of SWH) is measured via SOLO software, in line with the procedure named as Exigences Techniques n° 14 (refer to Document Rapport technique Calculation production SWH KWh-y) de CSTBat (document /32/ Rapport technique Calculation production SWH KWh-y).</p> <p>Within SOLO, the following parameters are integrated:</p> <ul style="list-style-type: none"> • V = Reservoir water volume (varies from 150 L – 300 L, depending on model). • T = Exit Hot water temperature (frequently 45°C) • Cs = stockage thermal capacity (depending on model) • Ac = catchment surface (m², depends on model) • Us = loss stockage coefficient (W/°K) • Uc = coefficient report – losses catchment coefficient (W/°K) • Inclination Pannel (frequently 30°) • Orientation (frequently 0° South) <p>All these parameters enable SOLO to define Ok (MWh/y).</p> <p>For CPA-1, CPA-2, CPA-3, CPA-4, CPA-5, CPA-6, CPA-7 and CPA-8:</p> <p>It is found that under every registered CPA, CPA-1 to CPA-8, in Annex 3 is detailed a table indicating Ok parameter values for every of the SWH model, as well as number of installed SWH's.</p> <p>Under MR version 1.0, Appendix 2 it is also detailed a table which refers to Ok parameter values for every of the SWH model, as well as number of installed SWH's, in MWh/y. Each of applicable ER Calculation sheets, WB_MP#1_PoA-4659_0001 to WB_MP#1_PoA-4659_0008, (eight excel documents), also contain a table with applicable values for Ok (MWh/y), for every SWH included and defined under each registered CPA.</p> <p>The auditor team have checked these values and concluded that some values for Ok from some types of SWH are different in the referred documents.</p>
Findings	As a result, CAR#01 and CL#08 have been raised:

CAR#01

The PP is requested to clarify why given values for O_k (*Annual energy output of each type of SWH, MWh/y*) differ from data defined within applicable and registered CPA's, which also means, they differ from the O_k data parameters contained within the calculation sheet named as *WB_MP#1_PoA-4659_000n, sheet 5, SWH data*. This issue is also found within Monitoring Report (MR), version 1.

Examples:

Model 1901

CPA-1, $O_k = 2.278$ MWh/y and calculation sheet = 2.278

CPA-2, 1.4 MWh/y and calculation sheet = 1.4

In MR = 2.278

Model 1902

CPA-1, $O_k = 2.000$ MWh/y and calculation sheet = 2.000

CPA-2, 2.538 MWh/y and calculation sheet = 2.538

In MR = 2.538

Model 2002

CPA-2, 1.658 MWh/y and calculation sheet = 1.658

In MR = 2.006

CL#08

The PP is requested to clarify to audit team how the parameter O_k (Annual energy output of the SWH k) - MWh/y has been calculated (please refer to *WB_MP#1_PoA-4659_000n*).

The PP responses and actions:

All O_k values which were used in the emission reduction calculations have been verified in different cross-checks. Each check is in detail described below. The resulting updates in the excel calculations are explained as well. Finally the additional proof documents have been listed.

CHECK 1: WB CPA "1" versus WBs CPA "2-8":

- By comparing the O_k values for each SWH model between all the Workbooks CPA1-8 inconsistencies for 17 SWH models have been found. (305, 1401, 1402, 1403, 1801, 1802, 1803, 1804, 1901, 1902, 2002, 2101, 2102, 2103, 2104, 2201, 2202). More precisely it could be concluded that inconsistencies occurred exclusively for CPA1.

CHECK 2: ER PDD ex-ante CPA "1" versus ER PDD ex-ante CPA "2-8":

- By comparing the O_k values for each SWH model between all ER PDD ex-ante CPA1-8 the identical inconsistencies have been found as in CHECK 1.

CHECK 3: O_k value currently listed in ANNEX MR:

- In a next step it was checked which O_k value was listed in the Annex of the Monitoring Report version 1, CPA 1 (meaning incorrect value) or CPA2-8 (meaning correct value). In total 10 incorrect values have been listed. (305, 1801, 1803, 1804, 1901, 2002, 2101, 2102, 2104, 2201). These 10 values have been updated.

Conclusion for correct value: always "2-8":

- For the sake of clarity, all O_k values for CPA2-8 are correct. A more detailed proof was provided.
- The emission reduction calculations for CPA1 as well as the global ER value have been updated accordingly.

Conclusion for CAR1:

- Update WB CPA1 with correct values was done.
- Update WB summary with correct values was done.

	<ul style="list-style-type: none"> Update MR Annex with correct values was done. <p>The following documents are provided:</p> <ul style="list-style-type: none"> CAR1_OK_values_check_10NOV2015_v2.xlsx (Document /33/) UPDATED2016_CPA-DD-1 real case CLEAN VERSION. (Document /23/) WB_MP#1_PoA-4659_0001_10NOV2015.xlsx (Doc. /24/) WB_summary_MP#1_PoA-4659_0001-0008_10NOV2015.xlsx (Doc. /25/) MR_MP#1_PoA-4659_0001-0008_10NOV2015_track change.pdf (Doc. /22/) <p>The provided documents have been checked by the auditor team and the same have been found correct, additionally the ER calculations have been updated. Hence the CAR#01 is closed.</p> <p><u>CL#08</u></p> <p>The PP is requested to clarify to audit team how the parameter Ok (Annual energy output of the SWH k) - MWh/y has been calculated (please refer to WB_MP#1_PoA-4659_000n).</p> <p>The PP's response:</p> <p>As already explained within the validation report, Ok is the estimated annual energy output of SWH k and is used in the calculation of the fuel consumption of the technologies that would have been used in the absence of the CPA and PoA.</p> <p>The values used for the annual energy output of a SWHk are the output of a recognised SWH model. The model currently used was developed by the Centre Scientifique et Technique du Bâtiment (Scientific and Technical Centre for the Construction Industry– CSTB) and is called SOLO.</p> <p>The software SOLO can be accessed online :</p> <ul style="list-style-type: none"> Online version: http://www.tecsol.fr/st_uk/default-uk.htm Download: <p>The two platforms use the same calculation method (SOLO) and similar input values. The input values are discussed in Annex 3 of the PoA-DD and are, for most of them, specific for each SWH and taken from the manufacturer's specifications for each SWH.</p> <p>SOLO has been used since the beginning of the PoA and will be used until the end of it. The software is not updated annually and is based on reliable historical data. As such, ex-ante application of the software is appropriate and there is no need to monitor the applied soft-ware data</p> <p>Document provided: "CL8_etat_modele.pdf" (Document /34/).</p> <p>The provided document has been checked by the auditor team and found correct. Hence the CL#08 is closed.</p>
Conclusion	<p>Applus+ LGAI confirms that the data and the parameter fixed ex ante have been correctly listed.</p> <p>The parameter fixed ex-ante for required parameter has been verified by checking the information flow and in compliance with the monitoring plan of the registered PoA DD version 6 (Doc: /02/), from the CPA-01 version 6 (Doc: /23/), from the registered CPA-2 to CPA-06 all in version 3 (five CPA) and from CPA-7 to CPA-8 both in version 2 (two CPA), (documents: /04/ to /11/), from de MR Ver 02 (Doc: /22/) and from the eight ER calculation sheet: WB_MP#1_PoA-4659_001 Updated (Document: /24/), and seven WB_MP#1_PoA-4659_0002 to 008 (Documents: /14/ to /20/, in all: sheet 5, SWH data</p> <p>The requirement of VVS v09.0 §§ 392-393 have been met.</p>

Parameter 4:

Data/parameter	U
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Unit	%
Description	Usage rate of the SWH
Source of data	"Figures of the Tunisian tourism 2008" ("Le tourisme tunisien en chiffres 2008") published by the National Tourism Bureau of Tunisia
Value(s) applied	99%
Choice of data or measurement methods and procedures	/
Purpose of data	Calculation of baseline emissions
Additional comments	"Figures of the Tunisian tourism 2008" states that the average length of hotel stays for Tunisian residents was 2.2 nights in 2008. This represents 0.6% of the year. As such, a 99% usage rate was defined for the SWH, which is higher than the statistics and is hence considered conservative.

Means of verification	<p>The parameter Usage rate of the SWH, U (%), is referred from the registered PoA DD version 6, from the registered CPA-01 version 5 (from de updated CPA-01 updated version 6), from the registered CPA-2 to CPA-06 all in version 3 (five CPA) and from CPA-7 to CPA-8 both in version 2 (two CPA), which is used in line with the selected methodology ex-ante (AMS.I.C version). The value of Usage rate of the SWH is used for the calculation of baseline emissions is considered from the report of: "Le tourisme tunisien en chiffres 2008", the verification team has assessed applicable documentation which support this parameter (e.g. Document /35/: Tourisme tunisien en chiffres 2008.tif). As a result of this analysis, annual average hotel stay for Tunisian residents has been defined as 2.2 days per year, which represents U as 0.60%. PP has applied this factor with a value of 1%, which represents U as 99%. It can be concluded by the verification team that PP has integrated a more conservative value of U (referred to the report), regarded in accordance with applied methodology.</p> <p>The reported value (99%) is verified in the MR Version 1.0 and in the updated version 2.0 (doc: /22/ and in the eight ER calculation excel sheet: WB_MP#1_PoA-4659_0001_10NOV2015 to WB_MP#1_PoA-4659_0008, (eight excel, in all of them, sheet 6.ER, Usage rate U). Documents /24/, /14/, /15/, /16/, /17/, /18/, /19/ and /20/.</p>
Findings	<p>It has been raised CL#6</p> <p>The PP is requested to submit to audit team applicable justifications in order to give sufficient evidence of the Usage Rate values which have been defined and refer to <i>National National Tourism Bureau of Tunisia, ex-ante</i>.</p> <p>The document has been provided by PP: /35/: Tourisme tunisien en chiffres 2008.tif</p> <p>The provided document has been checked by the auditor team and the same have been found correct. Hence the CL#06 is closed.</p>
Conclusion	<p>Applus+ LGAI confirms that the data and the parameter fixed ex ante have been correctly listed. The parameter fixed ex-ante for required parameter has been verified by checking the information flow and in compliance with the monitoring plan of the registered PoA DD version 6 (/02/), from the registered CPA-01 version 5 and from the updated CPA-01 version 6 (/23/), from the registered CPA-2 to CPA-06 all in version 3 (five CPA) and from CPA-7 to CPA-8 both in version 2 (two CPA) (Documents /23/ and /05/ to /11/, the requirement of VVS v09.0 §§ 392-393 have been met.</p>

Parameter 5:

Data/parameter	Conversion factor
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Unit	-
Description	Conversion factor from GJ to MWh
Source of data	/
Value(s) applied	1/3.6
Choice of data or measurement methods and procedures	/
Purpose of data	Calculation of baseline emissions
Additional comments	/

Means of verification	<p>The parameter Conversion factor from GJ to MWh is referred from the registered PoA DD version 6, from the registered CPA-01 version 5, from the registered CPA-2 to CPA-06 all in version 3 (five CPA) and from CPA-7 to CPA-8 both in version 2 (two CPA), which is used in line with the selected methodology ex-ante. The value of Conversion factor used for the calculation of baseline emissions is considered from various authorized international sources (i.e.: <i>International Energy Agency and others</i>):</p> <p>1 MWh = 3.6 GJ (or 1 GJ = 0.277777777777778 MWh).</p> <p>The reported value is verified in the MR Version 1.0, in the updated MR Version 2.0 (/22/), from the registered CPA-2 to CPA-06 all in version 3 (five CPA) and from CPA-7 to CPA-8 both in version 2 (two CPA), docs /23/ and /04/ to /11/, and in the eight ER calculation excel sheet: WB_MP#1_PoA-4659_0001-10NOV2015 to WB_MP#1_PoA-4659_0008, (eight excel, in all of them, sheet 6.ER, EF value), documents /24/ and /14/, /15/, /16/, /17/, /18/, /19/ and /20/.</p>
Findings	No non-conformity was observed during the assessment for monitoring plan against the applied methodology. Consequently, no finding was raised.
Conclusion	<p>Applus+ LGAI confirms that the data and the parameter fixed ex ante have been correctly listed. The parameter fixed ex-ante for required parameter has been verified by checking the information flow and in compliance with the documents referred in the previous paragraph (Means of verification).</p> <p>The requirement of VVS v09.0 §§ 392-393 have been met</p>

Parameter 6:

Data/parameter	<i>EFCO_{2,i,y}</i>
Unit	tCO ₂ /TJ
Description	CO ₂ emission factor of fossil fuel type i in year y
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	See Annex of CPA-DD
Choice of data or measurement methods and procedures	/
Purpose of data	Calculation of baseline emissions
Additional comments	To calculate GEF (for GEF results fixed per CPA see Appendix 2 of MR)

Means of verification	The parameter CO ₂ emission factor of fossil fuel type i in year y, <i>EFCO_{2,i,y}</i> (tCO ₂ /TJ),
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is referred from the registered PoA DD version 6, from the registered CPA-01 version 5 (Doc /03/), from the updated CPA-01 version 6 (/23/), from the registered CPA-2 to CPA-06 all in version 3 (five CPA) and from CPA-7 to CPA-8 both in version 2 (two CPA), documents /05/, /06/, /07/, /08/, /09/, /10/ and /11/), which is used in line with the selected methodology ex-ante (AMS.I.C version 17, doc /26/). The value of CO₂ emission factor of fossil fuel is used for the calculation of baseline emissions is considered from the document /30/- IPCC 2006, page 24-25), the verification team has assessed applicable documentation which support this parameter .

For CPA-01 to CPA-08:

Values of ***EF_{CO₂,i,y}*** for LPG and NG have been taken from 2006 IPCC Guidelines for National Greenhouse Gas Inventories (document /30/ - IPCC 2006, page 24-25), where it is detailed:

LPG: 63,100 Kg LPG/TJ

In the excel sheet the values are in tmCO₂/MWh, consequently, the conversion is:
 $63,100 \times 3.6 / 1,000,000 = 0.227 \text{ tmCO}_2/\text{MWh}$

GN: 56,100 Kg GN/TJ

Conversion: $56,100 \times 3.6 / 1,000,000 = 0.202 \text{ tmCO}_2/\text{MWh}$

These parameters are verified and confirmed by the verification team.

Both reported values (0.227 and 0.202 tmCO₂/MWh) are verified in the MR Version 1.0 (section H-1) and in the eight ER calculation excel sheet: WB_MP#1_PoA-4659_0001 to WB_MP#1_PoA-4659_0008, (eight excel, in all of them, sheet 6.ER, EF value).

In addition for CPA-1

A part from LPG and NG, in CPA-1 are detailed, the following additional factors:

Grid electricity 0.550 tmCO₂/MWh

Other: 0.288 tmCO₂/MWh

Where for Grid electricity:

Source: STEG Electricity Retrospective Statistics 2000-2010.

Under PoA-DD, pages 29 and 47, it has been defined the parameter of Combined Margin Emission Factor as 0.550 tmCO₂/MWh, where under CPA-1, pages 21 and 39, it is found the same value.

Under PoA DD and all CPA's, CPA-1 to CPA-8, it can be found in the section named as Appendix 3. The values for calculation of the grid emission factor with the values of ***FC_{i,m,y}***, ***NCV_{i,y}***.

EG_{m,y} and ***η_{m,y}*** are used for the calculation of ***EF_{CO₂,i,y}*** for each source of "grid electricity":

Refer to parameter ***EF_{CO₂,i,y}*** .

Source *STEG Electricity Retrospective Statistics 2000-2010*. (Doc /44/)

This case only applies for CPA-1.

Sources:

STEG – Statistiques Rétrospectives d'Electricité 1997-2007. (Doc /45/)

STEG – Rapport Annuel 2005 (ra_steg_2005. Doc /36/).

The verification team has assessed these values during the on-site verification and confirms its validity.

Where for Other.

This includes households which did not have a water heater previously as well as

	<p>households for which no data was entered into the Prosol 2 database. This is calculated as the weighted average of the EF of the other energy sources in the CPA (LPG, natural gas, electricity), adjusted to take into account potential existing SWH installed before the program in the baseline (in practice, the weighted average conduction for EF LPG (0.227), NG (0.202) and Electricity (0.550) has been conducted, combined with respective value of eff_i (86, 84 y 94%) by taking into consideration -3% to make results ore conservative; i.e. 0.288 $tmCO_2/MWh$ for Other .</p> <p>Both reported values (0.550 and 0.288 $tmCO_2/MWh$) are verified in the MR Version 2.0 (section H-1) (doc /22/) and in the ER calculation excel sheet: WB_MP#1_PoA-4659_0001 sheet 6.ER, EF value: grid electricity and other (doc. /24/).</p> <p>NOTE: Under CPA-02 to CPA-08 Grid electricity and others are defined with their applicable values. On the other hand, these values have not been applied for applicable ER Calculation sheets, where only values for LPG and Natural Gas have been applied. This justification follow same structure given for parameters 1 and 2 ($w_{i,x}$ eff_j) of this verification report.</p>
Findings	<p>The CL#04 was raised as the PP to clarify the followings: The PP is requested to clarify EF_i value for the energy type named as OTHERS within CPA-1 (as well as within its applicable calculation sheet).</p> <p>PP has justified to audit team that the applicable value of 0.288 given to EF_i was accordingly justified and clarified within applicable CPA-DD, which has been already approved and registered by UNFCCC. In addition, it has been clarified that this value is resulted from the weight statically application of values for LPG, natural gas and grid electricity. Furthermore, it has been added 3% regarding SWH application. All of this has been explained within already registered PoA-DD</p> <p>The calculations were checked and found to be correct, hence accepted, the CL#04 was closed satisfactorily.</p> <p>Further details have been provided in Appendix 4 (findings) of this verification report.</p>
Conclusion	<p>Applus+ LGAI confirms that the data and the parameter fixed ex ante have been correctly listed.</p> <p>In the CPA-1 the four values of the parameter EF (LPG, NG, Electricity and Others) fixed ex-ante for required parameter has been verified by checking the information flow and in compliance with the monitoring plan of the registered PoA DD version 6 (02/), from the registered CPA-01 version 5 (and from the updated CPA-1 Version 6, doc /23/) and from the excel sheet WB_MP#1_PoA-4659_0001_10NOV2015, doc /24/.</p> <p>Under registered CPA-2 to CPA-08 (seven CPA) the two values of the parameter EF (LPG and NG) fixed ex-ante for required parameter has been verified by checking the information flow and in compliance with the monitoring plan of the registered PoA DD version 6, from the registered CPA-2 to CPA-06 all in version 3 (five CPA), from CPA-7 to CPA-8 both in version 2 (two CPA), (docs /05/, /06/, /07/, /08/, /09/, /10/ and /11/) and from the excel sheet WB_MP#1_PoA-4659_0002 to WB_MP#1_PoA-4659_0008 (seven excel sheet), docs (/14/, /15/, /16/, /17/, /18/, /19/ and /20/).</p> <p>The requirement of VVS v09.0 §§ 392-393 have been met.</p>

Parameter 7:

Data/parameter	$FC_{i,m,y}$
Unit	t, m^3
Description	Amount of fossil fuel type i consumed by the group of power units m in year y (mass or volume unit)

Source of data	STEG Electricity Retrospective Statistics 1997-2007 STEG Electricity Retrospective Statistics 2000-2010
Value(s) applied	See Annex of CPA-DD
Choice of data or measurement methods and procedures	/
Purpose of data	Calculation of baseline emissions
Additional comments	To calculate GEF (for GEF results fixed per CPA see Appendix 2 of the MR)

Means of verification	<p>The parameter Amount of fossil fuel type i consumed by the group of power units m in year y ($FC_{i,m,y}$, in t or m^3) is referred from the registered PoA DD version 6 (/02/), from the registered CPA-01 version 5 (/04/) and from the updated CPA-01 version 6 (/23/), from the registered CPA-2 to CPA-06 all in version 3 (five CPA) and from CPA-7 to CPA-8 both in version 2 (two CPA), (docs /05/, /06/, /07/, /08/, /09/, /10/ and /11/), which is used in line with the selected methodology ex-ante. The value of this factor is used for the calculation of baseline emissions is considered in the official released statistics by the national power utility; publicly accessible and reliable data source; latest data available.</p> <p>As a result applicable source for CPA-1 is: Electricity Retrospective Statistics 1997-2007, when for CPA-2 to CPA-8 (seven CPA's) is: Electricity Retrospective Statistics 2000-2010. This documentation has been revised by the auditor team and its application has been found correct. Documents /44/ and /45/.</p> <p>In fact, $FC_{i,m,y}$ is only used under CPA-1 (/23/) for the calculation of $EF_{CO2,i,y}$, $FC_{i,m,y}$, $EG_{m,y}$ and $\eta_{m,y}$. This is why CPA-1 is the only one which contains calculation referring to EF Grid electricity (EF = 0.550 $tmCO_2/MWh$). Under the rest of seven applicable CPA's, it has been justified the applicable parameters for this calculation, in concrete terms, $w_{i,x}$ (see this factor).</p> <p>Under Annex 3 of PoA-DD (/02/), within tables from pages 42-44, it is defined Net calorific value $FC_{i,m,y}$ as well as the aforementioned parameters, which apply to each of the different power plants (i.e. steam turbines, gas turbines, combined cycle, renewable, and so on) per year (2005 - 2007). All of these are applied to calculation of EF, defined as 0.550 $tmCO_2/MWh$, (pag 47) of PoA-DD.</p> <p>In addition, under Annex 3 of CPA-1 (/23/), the same aforementioned tables are found, referring to the same calculation methodology (refer to pages 34, 36 and 39). As it has been before concluded, for CPA-2 to CPA-8 it has not been applied this calculation methodology, due to the fact that Grid Electricity factor is not used.</p> <p>The reported value $FC_{i,m,y}$ is regarded as a intermediate factor, only defined under PoA-DD and applicable CPA's. As a result, it is not defined under MR version 2.0 (/22/), as well as under applicable ER calculation sheet (WB_MP#1_PoA-4659_0001, /24/ and WB_MP#1_PoA-4659_0008 to WB_MP#1_PoA-4659_0008, /14/ to /20/), due to the fact that it has been confirmed that it is only applied for EF parameter, which is a parameter defined under MR version 2 as well as under applicable ER calculation sheet.</p>
Findings	No non-conformity was observed during the assessment for monitoring plan against the applied methodology. Consequently, no finding was raised.
Conclusion	Applus+ LGAI confirms that the data and the parameter fixed ex ante $FC_{i,m,y}$ have been assessed and correctly listed in the POA-DD (doc: /02/) and in the CPA-1 to 8 (docs /23/, /05/, /06/, /07/, /08/, /09/, /10/ and /11/). However, it has been only used in under CPA-1, doc /23/, in order to calculate applicable value of EF_i . Values regarding $FC_{i,m,y}$ are yearly defined in line with energy source. These parameters fixed ex-ante for required parameter has been verified by checking the information from the referred sources and in compliance with the monitoring plan of the registered PoA DD version 6 (/02/) and from the registered CPA-01 version 5 (/04/) and in the updated version 6

	(/23/). As a result, this value is not applied for CPA-2 to CPA-8. The requirement of VVS v09.0 §§ 392-393 has been met.
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Parameter 8:

Data/parameter	$NCV_{i,y}$
Unit	GJ/mass or volume unit
Description	Net calorific value (energy content) of fossil fuel type i in year y
Source of data	STEG Electricity Retrospective Statistics 1997-2007 STEG Electricity Retrospective Statistics 2000-2010
Value(s) applied	See Annex of CPA-DD
Choice of data or measurement methods and procedures	/
Purpose of data	Calculation of baseline emissions
Additional comments	To calculate GEF (for GEF results fixed per CPA see Appendix 2 of MR)

Means of verification	<p>The parameter Net calorific value (energy content) of fossil fuel type i in year y ($NCV_{i,y}$, in GJ/mass or volume unit) is referred from the registered PoA DD version 6 (doc /02/), from the registered CPA-01 version 5 (/04/) and from the updated CPA-1 version 6 (/23/), from the registered CPA-2 to CPA-06 all in version 3 (five CPA) and from CPA-7 to CPA-8 both in version 2 (two CPA), (docs /05/, /06/, /07/, /08/, /09/, /10/ and /11/), which is used in line with the selected methodology ex-ante. The value of this factor is used for the calculation of baseline emissions is considered in the official released statistics by the national power utility; publicly accessible and reliable data source; latest data available.</p> <p>As a result, for CPA-1 the source is Electricity Retrospective Statistics 1997-2007, when for CPA-2 to CPA-8 is: Electricity Retrospective Statistics 2000-2010, documents assessed by audit team and the values are found correct. Documents /44/ and /45/.</p> <p>In fact, $NCV_{i,y}$ is only used under CPA-1 for the calculation of $EFCO2_{i,y}$, $FC_{i,m,y}$, $EG_{m,y}$ and $\eta_{m,y}$. This is why CPA-1 is the only one which contains calculation referring to EF Grid electricity (EF = 0.550 tmCO2/MWh). Under the rest of seven applicable CPA's, it has been justified the applicable parameters for this calculation, in concrete terms, $w_{i,x}$ (see this factor).</p> <p>Under Annex 3 of PoA-DD, within tables from pages 42-44, it is defined Net calorific value $NCV_{i,y}$ as well as the aforementioned parameters, which apply to each of the different power plants (i.e. steam turbines, gas turbines, combined cycle, renewable, and so on) per year (2005 - 2007). All of these are applied to calculation of EF, defined as 0.550 tmCO2/MWh.</p> <p>In addition, under Annex 3 of CPA-1, the same aforementioned tables are found, referring to the same calculation methodology (refer to pages 34, 36 and 39). As it has been before concluded, for CPA-2 to CPA-8 it has not been applied this calculation methodology, due to the fact that Grid Electricity factor is not used.</p> <p>The reported value $NCV_{i,y}$ is regarded as a intermediate factor, only defined under PoA-DD and applicable CPA's. As a result, it is not defined under MR version 2.0 (doc /22/) as well as under applicable ER calculation sheet (WB_MP#1_PoA-4659_0001_10NOV_2015, /24/, and WB_MP#1_PoA-4659_0002 to WB_MP#1_PoA-4659_0008, /14/ to /20/), due to the fact that it has been confirmed that it is only applied for EF parameter, which is a parameter defined under MR version 2 as well as under applicable ER calculation sheet.</p>
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Findings	No non-conformity was observed during the assessment for monitoring plan against the applied methodology. Consequently, no finding was raised.
Conclusion	<p>Applus+ LGAI confirms that the data and the parameter fixed ex ante NCV_{i,y} have been assessed and correctly listed in the POA-DD (doc: /02/) and in the CPA-1 to 8 (docs /23/, /05/, /06/, /07/, /08/, /09/, /10/ and /11/), but used only in CPA-1, doc /23/ to calculate the factor EF_i.</p> <p>Values regarding NCV_{i,y} are yearly defined in line with energy source. These parameters fixed ex-ante for required parameter has been verified by checking the information from the referred sources and in compliance with the monitoring plan of the registered PoA DD version 6 (/02/) and from the registered CPA-01 version 5 (/04/) and in the updated version 6 (/23/). No As a result, this value is not applied for CPA-2 to CPA-8.</p> <p>The requirement of VVS v09.0 §§ 392-393 have been met.</p>

Parameter 9:

Data/parameter	EG_{m,y}
Unit	MWh
Description	Net electricity generated by power plant / unit m in year y
Source of data	STEG Electricity Retrospective Statistics 1997-2007 STEG Electricity Retrospective Statistics 2000-2010
Value(s) applied	See Annex of CPA-DD
Choice of data or measurement methods and procedures	/
Purpose of data	Calculation of baseline emissions
Additional comments	To calculate GEF (for GEF results fixed per CPA see Appendix 2 of MR).

<p>Means of verification</p>	<p>The parameter Net electricity generated by power plant / unit m in year y ($EG_{m,y}$, in MWh) is referred from the registered PoA DD version 6 (doc /02/), from the registered CPA-01 version 5 (/04/) and from the updated CPA-1 version 6 (/23/), from the registered CPA-2 to CPA-06 all in version 3 (five CPA) and from CPA-7 to CPA-8 both in version 2 (two CPA), (docs /05/, /06/, /07/, /08/, /09/, /10/ and /11/), which is used in line with the selected methodology ex-ante. The value of this factor is used for the calculation of baseline emissions and is considered in the official released statistics by the national power utility; publicly accessible and reliable data source; latest data available.</p> <p>As a result, for CPA-1 the source is Electricity Retrospective Statistics 1997-2007, when for CPA-2 to CPA-8 is: Electricity Retrospective Statistics 2000-2010, documents assessed by audit team and the values are found correct. Documents /44/ and /45/.</p> <p>In fact, $EG_{m,y}$ is only used under CPA-1 for the calculation of $EFCO2,i,y$, $FC_{i,m,y}$, $NCV_{i,y}$ and $\eta_{m,y}$. This is why CPA-1 is the only one which contains calculation referring to EF Grid electricity (EF = 0.550 tmCO₂/MWh). Under the rest of applicable CPA's, it has been justified the applicable parameters for this calculation, in concrete terms, $w_{i,x}$.</p> <p>Under Annex 3 of PoA-DD, within tables from pages 42-44, it is defined Net electricity generated by power plant / unit m in year y $EG_{m,y}$ as well as the aforementioned parameters, which apply to each of the different power plants (i.e. steam turbines, gas turbines, combined cycle, renewable, and so on) per year (2005 - 2007). All of these are applied to calculation of EF, defined as 0.550 tmCO₂/MWh.</p> <p>In addition, under Annex 3 of CPA-1, the same aforementioned tables are found, referring to the same calculation methodology (refer to pages 34, 36 and 39). As it has been before concluded, for CPA-2 to CPA-8 it has not been applied this calculation methodology, due to the fact that Grid Electricity factor is not used.</p> <p>The reported value $EG_{m,y}$ is regarded as a intermediate factor, only defined under PoA-DD and applicable CPA's. As a result, it is not defined under MR version 2.0 (doc /22/) as well as under applicable ER calculation sheet (WB_MP#1_PoA-4659_0001_10NOV_2015, /24/, and WB_MP#1_PoA-4659_0002 to WB_MP#1_PoA-4659_0008, /14/ to /20/), due to the fact that it has been confirmed that it is only applied for EF parameter, which is a parameter defined under MR version 2 as well as under applicable ER calculation sheet.</p>
<p>Findings</p>	<p>No non-conformity was observed during the assessment for monitoring plan against the applied methodology. Consequently, no finding was raised.</p>
<p>Conclusion</p>	<p>Applus+ LGAI confirms that the data and the parameter fixed ex ante $EG_{m,y}$ have been assessed and correctly listed in the POA-DD (doc: /02/) and in the CPA-1 to 8 (docs /23/, /05/, /06/, /07/, /08/, /09/, /10/ and /11/), but used only in CPA-1 to calculate the EF_i factor. Values regarding $EG_{m,y}$ are yearly defined in line with energy source. These parameters fixed ex-ante for required parameter has been verified by checking the information from the referred sources and in compliance with the monitoring plan of the registered PoA DD version 6 (/02/) and from the registered CPA-01 version 5 (/04/) and in the updated version 6 (/23/). As a result, this value is not applied for CPA-2 to CPA-8.</p> <p>The requirement of VVS v09.0 §§ 392-393 have been met.</p>

Parameter 10:

Data/parameter	$\eta_{m,y}$
Unit	%
Description	Average net energy conversion efficiency of power unit m in year y
Source of data	Annex I of the "Tool to calculate the emission factor for an electricity system"
Value(s) applied	See Annex of CPA-DD
Choice of data or measurement methods and procedures	/
Purpose of data	Calculation of baseline emissions
Additional comments	To calculate GEF (for GEF results fixed per CPA see Appendix 2 of MR)

Means of verification	<p>The parameter Average net energy conversion efficiency of power unit m in year y ($\eta_{m,y}$ in %) is referred from the registered PoA DD version 6 (doc /02/), from the registered CPA-01 version 5 (/04/), from the updated CPA-1 version 6 (/23/), from the registered CPA-2 to CPA-06 all in version 3 (five CPA) and from CPA-7 to CPA-8 both in version 2 (two CPA), (docs /05/, /06/, /07/, /08/, /09/, /10/ and /11/), which is used in line with the selected methodology ex-ante. The value of this factor $\eta_{m,y}$ is used for the calculation of Emission factor of power unit in a determinate year $EF_{EL,m,y}$ jointly with $EF_{CO2,m,i,y}$ (average CO2 emission factor of fuel type i used in power unit m in year y (CPA-01 pag 19, formula 8), take into account that this systematic is used only in case of power units in which only data on electricity generation and the fuel types used is available.</p> <p>$EF_{EL,m,y}$ is jointly applied with $EG_{m,y}$ for calculation of $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$, giving definitive value for $EF_{grid,CM,y}$ as 0.550 (combined margin CO2 emissions factor in year y).</p> <p>As a result, source of data used is the UNFCCC's document: "Tool to calculate the emission factor for an electricity system" (annex 1), documents assessed by audit team and the values found correct. Document /46/.</p> <p>In fact, $\eta_{m,y}$ is only used under CPA-1 for the calculation of $EF_{CO2,i,y}$, $FC_{i,m,y}$, $NCV_{i,y}$ and $\eta_{m,y}$. This is why CPA-1 is the only one which contains calculation referring to EF Grid electricity (EF = 0.550 tCO2/MWh). Under the rest of applicable CPA's, it has been justified the applicable parameters for this calculation, in concrete terms, $w_{i,x}$.</p> <p>Under Annex 3 of PoA-DD, within tables from pages 42-44, it is found (included in the calculations for each case), the Average net energy conversion efficiency of power unit values, all of these values are applied to calculation of factors $EF_{grid,OM,y} = 0.570$ y $EF_{grid,BM,y} = 0.531$ (tCO2/MWh) and finally to calculate the factor EF = 0.550 tCO2/MWh.</p> <p>In addition, under Annex 3 of CPA-1, the same aforementioned tables are found, referring to the same calculation methodology (refer to pages 34, 36 and 39). As it has been before concluded, for CPA-2 to CPA-8 it has not been applied this calculation methodology, due to the fact that Grid Electricity factor is not used.</p> <p>The reported value $\eta_{m,y}$ is regarded as a intermediate factor, only defined under PoA-DD and applicable CPA's. As a result, it is not defined under MR version 2.0 (doc /22/) as well as under applicable ER calculation sheet (WB_MP#1_PoA-</p>
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	4659_0001_10NOV_2015, /24/, and WB_MP#1_PoA-4659_0002 to WB_MP#1_PoA-4659_0008, /14/ to /20/), due to the fact that it has been confirmed that it is only applied for EF parameter, which is a parameter defined under MR version 2 as well as under applicable ER calculation sheet.
Findings	No non-conformity was observed during the assessment for monitoring plan against the applied methodology. Consequently, no finding was raised.
Conclusion	<p>Applus+ LGAI confirms that the data and the parameter fixed ex ante $\eta_{m,y}$ have been assessed and correctly listed in the POA-DD (doc: /02/) and in the CPA-1 to 8 (docs /23/, /05/, /06/, /07/, /08/, /09/, /10/ and /11/), but used only in CPA-1 to calculate the EF_i factor. Values regarding $\eta_{m,y}$ are yearly defined (2005 – 2007) for each of the SWH, in line with energy source.</p> <p>These parameter fixed ex-ante for required parameter has been verified by checking the information of referred sources and in compliance with the monitoring plan of the registered PoA DD version 6 (doc /02/) and from the registered CPA-01 version 5 (/04/) and in the updated version 6 (/23/). As a result, this value is not applied for CPA-2 to CPA-8.</p> <p>The requirement of VVS v09.0 §§ 392-393 have been met.</p>

1.4.2. Data and parameters monitored

Parameter 11:

Parameters monitored

Data/parameter	N _k																		
Unit	number																		
Description	Number of SWH k installed in the SSC-CPA x																		
Measured/calculated/ default	Measured																		
Source of data	Database developed by the PP (Prosol 2 database)																		
Value(s) of monitored parameter	<table><tr><td>CPA 1</td><td>CPA 2</td><td>CPA 3</td><td>CPA 4</td><td>CPA 5</td><td>CPA 6</td><td>CPA 7</td><td>CPA 8</td><td></td></tr><tr><td>14,017</td><td>11,149</td><td>12,339</td><td>12,821</td><td>13,978</td><td>12,702</td><td>12,191</td><td>14,230</td><td>103,427</td></tr></table>	CPA 1	CPA 2	CPA 3	CPA 4	CPA 5	CPA 6	CPA 7	CPA 8		14,017	11,149	12,339	12,821	13,978	12,702	12,191	14,230	103,427
CPA 1	CPA 2	CPA 3	CPA 4	CPA 5	CPA 6	CPA 7	CPA 8												
14,017	11,149	12,339	12,821	13,978	12,702	12,191	14,230	103,427											
Monitoring equipment	Prosol 2 database. The type and serial number, owner, location, supplier and installation date are entered into the Prosol 2 database.																		
Measuring/reading/ recording frequency	Included in Prosol Database after installation																		
Calculation method (if applicable)	N/A																		
QA/QC procedures	PP will carry out spot checks in order to ensure that the systems entered into the database are actually operating (see below F _{x,y}).																		
Purpose of data	Calculation of baseline emissions																		
Additional comments	N _k is considered as the number of SWH in the CPA _x minus the number of SWH that have lost their accreditation. The value is applied to the whole monitoring period even if the loss of the accreditation was later. The approach is then conservative																		

<p>Means of verification</p>	<p>The parameter Number of SWH k installed in the SSC-CPA x (N_k in whole number) is referred from the registered PoA DD version 6 (doc /02/), from the registered CPA-01 version 5 (/04/) and from the updated CPA-1 version 6 (/23/), from the registered CPA-2 to CPA-06 all in version 3 (five CPA) and from CPA-7 to CPA-8 both in version 2 (two CPA) (docs: /05/ to /11/), which is used in line with the selected methodology ex-ante.</p> <p>In the Prosol 2 data base installed SWH are defined, each solar water heating system is covered by a contract between the owner and ANME. The type and serial number, owner, location, supplier and installation date are entered into the Prosol 2 database. Applus+ LGAI confirm, after randomly sampling of the data base (50 samples), that the information is correct (document: /27/ File SWH example).</p> <p>ANME is carrying out periodically spot checks in order to ensure that the systems entered into the database are actually operating (see below factor 12: <i>F_{x,y}</i>).</p> <p>Due to the large amount of data (SWH) to be verified, the verification team has adopted an acceptance sampling approach (see Sampling section: I.4.3).</p> <p>Based on a randomly jointly assessment, it has been evaluated the 103.427 SWH Prosol 2 database with PP sampling conduction, based on 489 SWH, as well as with the sampling conducted by the DOE (54 SWH) during the on-site audit.</p> <p>Results from this assessment show coincident data values, when 100% of randomly sampled SWH were effectively installed.</p> <p>The value of this factor N_k is extracted from Prosol 2 to data parameter of ER Calculation Sheet, regarding each CPA (WB_MP#1_PoA-4659_0001_10NOV_2015 to WB_MP#1_PoA-4659_0008 (docs: /24/ and /14/ to /20/), Where this information is provided :</p> <ul style="list-style-type: none"> -Number -Supplier -Lot -Case -National Identity Card Number -Beneficiary -Installer -Province -Model <p>SWH' s ID are correlative. Sampling check has been conducted at a 100% level and Applus+ LGAI confirms that the data is correct.</p> <p>Total n. of verified SWH is defined as follows:</p> <table border="0"> <tr><td>CPA-1</td><td>14,017 SWH</td></tr> <tr><td>CPA-2</td><td>11,149</td></tr> <tr><td>CPA-3</td><td>12,339</td></tr> <tr><td>CPA-4</td><td>12,821</td></tr> <tr><td>CPA-5</td><td>13,978</td></tr> <tr><td>CPA-6</td><td>12,702</td></tr> <tr><td>CPA-7</td><td>12,191</td></tr> <tr><td>CPA-8</td><td>14,230</td></tr> <tr><td>TOTAL</td><td>103,427 SWH</td></tr> </table> <p>As it has been previously explained, sampling has been conducted randomly by checking SWH data information. More information please refer to section I.4.3.</p> <p>N_k value is defined for each SWH type under applicable ER calculation sheet of each CPA. It has been found that the same are correct and traceable.</p>	CPA-1	14,017 SWH	CPA-2	11,149	CPA-3	12,339	CPA-4	12,821	CPA-5	13,978	CPA-6	12,702	CPA-7	12,191	CPA-8	14,230	TOTAL	103,427 SWH
CPA-1	14,017 SWH																		
CPA-2	11,149																		
CPA-3	12,339																		
CPA-4	12,821																		
CPA-5	13,978																		
CPA-6	12,702																		
CPA-7	12,191																		
CPA-8	14,230																		
TOTAL	103,427 SWH																		

	Each N_k value is multiplied by its respective O_k factor, applying summation calculation after that, being considered for final ER Calculation
Findings	No non-conformity was observed during the assessment for monitoring plan against the applied methodology. Consequently, no finding was raised.
Conclusion	<p>Applus+ LGAI confirms that the data and the parameter fixed ex ante N_k, have been assessed and correctly listed in the POA-DD (/02/), in the CPA-1 to 8 (/23/ and /05/ to /11/), and in the WB_MP#1_PoA-4659_0001_10NOV2015 to WB_MP#1_PoA-4659_0008 (docs /24/ and /14/ to /20).</p> <p>Each parameter fixed ex-ante for required parameter has been verified by checking randomly the information of the referred sources and in compliance with the monitoring plan of the registered PoA DD version 6, from the registered CPA-01 to CPA-08 (docs /23/ and /05/ to /11/) and from the WB_MP#1_PoA-4659_0001_10NOV2014 to WB_MP#1_PoA-4659_0008 (docs /24/ and /14/ to /20).</p> <p>The requirement of VVS v09.0 §§ 392-393 have been met.</p>

Parameter 12:

Data/parameter	$F_{x,y}$																
Unit	%																
Description	Failure rate of the SWH (all types) in the SSC-CPA x in year y																
Measured/calculated/default	Measured through sampling (refer to section D.3). To be determined for each CPA																
Source of data	Sampling done by PP																
Value(s) of monitored parameter	<table><tr><td>CPA 1</td><td>CPA 2</td><td>CPA 3</td><td>CPA 4</td><td>CPA 5</td><td>CPA 6</td><td>CPA 7</td><td>CPA 8</td></tr><tr><td>8.3%</td><td>6.7%</td><td>8.8%</td><td>10.0%</td><td>8.3%</td><td>0.0%</td><td>8.8%</td><td>2.7%</td></tr></table>	CPA 1	CPA 2	CPA 3	CPA 4	CPA 5	CPA 6	CPA 7	CPA 8	8.3%	6.7%	8.8%	10.0%	8.3%	0.0%	8.8%	2.7%
CPA 1	CPA 2	CPA 3	CPA 4	CPA 5	CPA 6	CPA 7	CPA 8										
8.3%	6.7%	8.8%	10.0%	8.3%	0.0%	8.8%	2.7%										
Monitoring equipment	Determined during household visits as of sample list																
Measuring/reading/recording frequency	Once per Monitoring Period																
Calculation method (if applicable)	The failure rate is determined per CPA through a sampling organised by the PP. The sampling follows the rules and recommendations of the latest versions of the “Standard - Sampling and surveys for CDM PA and PoA” and the “Guideline - Sampling and surveys for CDM PA and PoA”. The failure rate of the sampled SWHs is applied to the whole population of the considered CPA																
QA/QC procedures	See section G.3																
Purpose of data	Calculation of baseline emissions																
Additional comments	<p>For this monitoring period, the monitoring frequency of the failure rate of the SWH ($F_{x,y}$) is only once for the whole monitoring period.</p> <p>The approach taken is conservative since the failure rate used for the whole monitoring period is the one related to the year that immediately precede the end of the monitoring period which can only be higher or equal to the failure rate of the first years of the monitoring period following the registration of the PoA and the inclusion of the CPAs.</p>																

Means of verification	<p>A)</p> <p>The parameter Failure rate of the SWH (all types) in the SSC-CPA x in year y ($F_{x,y}$ in %) is referred from the registered PoA DD version 6 (doc /02/), from the registered CPA-01 version 5 (/04/) and from the updated CPA-1 version 6 (/23/), from the registered CPA-2 to CPA-06 all in version 3 (five CPA) and from CPA-7 to CPA-8 both in version 2 (two CPA) (docs: /05/ to /11/), which is used in line with the selected methodology ex-ante.</p> <p>In the Prosol 2 data base installed SWH are defined, whose data parameters has been included from each CPA, to applicable calculation sheet WB_MP#1_PoA-4659_0001_10NOV_2015 to WB_MP#1_PoA-4659_0008 (docs /24/ and /14/ to /20//List of SWH)</p> <p>ANME is carrying out periodically spot checks in order to ensure that the systems entered into the database are actually operating (see previous factor 11: N_k).</p> <p>Due to the large amount of data (SWH) to be verified, the verification team has adopted an acceptance sampling approach (see Sampling section: I.4.3).</p> <p>The sample size of the verification is determined following the criterions and the recommendations of the documents: /37/ "Standard - Sampling and surveys for CDM PA and PoA" (v4.1, EB74 Annex 6, modified by EB 80, Annex 7) and /38/ "Guideline - Sampling and surveys for CDM PA and PoA" (v3.0, EB75, Annex 8), and the choice of the SWH to be verified is made through a randomized system, so that, based on a randomly jointly assessment, it has been evaluated the 103.427 SWH Prosol 2 database with PP sampling conduction, based on 489 SWH criteria described at :docs /24/ and /14/ to /20/): WB_MP#1_PoA-4659_0001_10NOV_2015 to WB_MP#1_PoA-4659_0008, sheet: 2.Sample Parameters, (based in: Equation to get the required sample size as per EB75, Annex 8, Appendix 1, par.12), for whose calculation methodology is regarded as correct by Applus+ LGAI. (for this calculations, a precision level of 10% associated to a confidence interval of 90%), PP's have conducted sampling under 2 stages, for the following SWH:</p> <p>CPA-1: 39 + 24 = 63 SWH CPA-2: 38 + 22 = 60 SWH CPA-3: 38 + 22 = 60 SWH CPA-4: 38 + 22 = 60 SWH CPA-5: 39 + 24 = 63 SWH CPA-6: 38 + 22 = 60 SWH CPA-7: 38 + 22 = 60 SWH CPA-8: 39 + 24 = 63 SWH TOTAL = 307 + 182 = 489 SWH</p> <p>For WB_MP#1_PoA-4659_0001_10NOV2015 to WB_MP#1_PoA-4659_0008, sheet 3.Sampled (docs /24/ and /14/ to /20/)</p> <p>As a result of this sampling, the following conclusions have been resulted:</p> <p>a) Valid or Non-valid results, which depend on SWH availability. b) For valid results, operation availability is taken into account.</p> <p>$F_{x,y}$ factor has been calculated among SWH which were not operative during the visits out of the SWH total which were sampled. This value varies from 0 - 10%, depending on applicable CPA.</p> <p>The failure percentage of this sampling is applied to the whole population of the considered CPA.</p>
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	<p>See WB_MP#1_PoA-4659_0001_10NOV_2015 to WB_MP#1_PoA-4659_0008, sheet 4.results, (docs /24/ and /14/ to /20/).</p> <p>Applus+ LGAI confirms that the values obtained by PP are correct for $F_{x,y}$, as follows:</p> <p>CPA 1 = 8.3% CPA 2= 6.7% CPA 3= 8.8% CPA 4= 10.0% CPA 5= 8.3% CPA 6= 0.0% CPA 7= 8.8% CPA 8 = 2.7%</p> <p>B)</p> <p>Verification team during on site audit conduction conducted smaller randomly sampling of 54 SWH's. Refer to section I.4.3. and Appendix 5.</p> <p>Criteria conducted by Applus+LGAi for SWH number was based on 90/10 confidence/precision, an AQL of 1.0% and UQL of 20% were applied, and a producer risk of 10% and a consumer risk of 10% were determined</p> <p>Results from this assessment show coincident data values but lower failure rates: 100% of sampled SWH were working. (Auditor team's failure rate $F_{x,y}$ = 0%)</p> <p>As a result, it can be concluded that the PP results of failure rate are more conservative criteria, which means that PP sampling results are regarded as valid and effective.</p> <p>The detailed sampling and more referred information is described in section I.4.3. Sampling and in Appendix 5.</p> <p>Values for $F_{x,y}$ in %, regarding each CPA, are taken into account for ER calculation under WB_MP#1_PoA-4659_0001 to WB_MP#1_PoA-4659_0008,/ .ER, parameter: Failure rate $F_{x,y}$. Applus+ LGAI confirms that this data is correct.</p>
Findings	No non-conformity was observed during the assessment for monitoring plan against the applied methodology. Consequently, no finding was raised.
Conclusion	<p>Applus+ LGAI confirms that the data and the parameter <i>Failure rate $F_{x,y}$</i>, have been assessed and correctly listed in the POA-DD DD (/02/), in the CPA-1 to 8 (/23/ and /05/ to /11/), and in the WB_MP#1_PoA-4659_0001_10NOV2014 to WB_MP#1_PoA-4659_0008 (docs /24/ and /14/ to /20/).</p> <p>This parameter has been verified by checking the randomly sampling conduction made by PP. As a result, it can be concluded that the PP results of failure rate are more conservative criteria, which means that PP sampling results are regarded as valid and effective.</p> <p>The requirement of VVS v09.0 §§ 392-393 have been met.</p>

I.4.3. Implementation of sampling plan

Means of verification	<p>A)</p> <p>ANME SAMPLING PLAN</p> <p>In line with description of MR version 1.0 (/01/), section G.3, verification team has evaluated that ANME has conducted within May to October 2015 an independent sampling. This sampling has been conducted twice, due to the fact that during first sampling conduction, number of valid SWH's as per total number of sampled SWH's was inferior to defined values.</p> <p>As a result, 489 SWH's have been sampled, in line with CPA's criteria and $F_{x,y}$.</p> <p>All of these results are shown under WB_MP#1_PoA-4659_0001_10NOV_2015 to WB_MP#1_PoA-4659_0008 (docs /24/ and /14/ to /20), as well as under WB_summary_MP#1_PoA-4659_0001-0008_10NOV2015 (doc /25/).</p> <p>Verification team has evaluated that methodology calculation for the sampling determination as well as applicable calculation and SWH details were correct.</p> <p>In addition, it has been considered, for these calculations, a precision level of 10% associated to a confidence interval of 90%.</p> <p>Documents of reference and ANME procedures and templates</p> <p>/37/ "Standard - Sampling and surveys for CDM PA and PoA" (v4.1, EB74 Annex 6, modified by EB 80, Annex 7)</p> <p>/38/ "Guideline - Sampling and surveys for CDM PA and PoA" (v3.0, EB75, Annex 8)</p> <p>/39/ "Fiche de Contrôle du CES (Monitoring MDP)"</p> <p>/40/ "Fiche de validation interne des résultats de l'échantillonnage"</p> <p>/41/ ANME procedure visites control Prosol</p> <p>B) VERIFICATION TEAM SAMPLING</p> <p>The verification team has conducted on-site sampling approach based on <i>Sampling and surveys for CDM project activities and programmes of activities Version 03.0</i> (EB 75), (Doc /38/)</p> <p>On practice, a sample of households was selected from PROSOL database. The sample was selected randomly from the PROSOL database in order to comprise installations from different geographical areas within the boundaries of CPA-001 to CPA-008. The sample size was calculated to have a 10% chance to wrongly reject the PPs record and a 10% to wrongly accept the PP's record, considering a conservative acceptable quality level of 0.5% and unacceptable quality level of 10%, as per ANME results.</p> <p>According to the tables provided in the Standard for Sampling and Surveys, the resulting minimum sample size was 54 SWH. In total, 54 SWH were checked. In order to verify the full range of information relevant to the calculation of emissions reductions, verification team chose to apply the following criteria of field/onsite checks to the selected sample:</p> <ul style="list-style-type: none"> • Province across Tunisia. • SWH model
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	<ul style="list-style-type: none"> CPA coverage <p>Regarding province across Tunisia, 5 provinces have been selected. Selected criteria of these 5 provinces have been made in line with proximity from ANME central offices and household heterogeneous profile (i.e. urban usage/ rural-agricultural usage). Household heterogeneous profile gives relevant information of SWH frequency usage and level of satisfaction.</p> <p>Regarding proximity criteria, it can be added that due to the current political situation in Tunisia, it was concluded that it would be safer for all the team to perform on-site inspections across closest regions.</p> <p>When it comes to SWH model and CPA coverage, all models and all CPA's have been coverage for the on-site assessment.</p> <p>For more information, please refer to table below.</p>
Findings	<p>A CL#07 was raised: The PP is requested to clarify to audit team why an additional sampling was conducted under the global process of sampling monitoring (please refer to calculation sheet named as WB_MP#1_PoA-4659_000n, being <i>n</i> the applicable n° of registered CPA-DD).</p> <p>The PP's response: Due to lack of availability of the beneficiaries of SWH sorted in the first sampling, the minimum number of SWH per CPA to be visited and checked, following the "Standard - Sampling and surveys for CDM PA and PoA" (v4.1, EB74 Annex 6, modified by EB 80, Annex 7), was not reached. A second sampling campaign was then necessary. All the results of the two sampling campaigns are clearly stated in the Excel spread sheets WB_MP#1_PoA-4659_000n and were considered in the determination of the parameter "Failure rate - Fx,y</p> <p>No documentation is required for the closing of CL, given that 1st and 2nd sampling have been included within WB_MP#1_PoA-4659_000n. Given clarifications and explanations are regarded as sufficient to support the necessity of performing a second sampling conduction.</p> <p>In consequence the CL#07 is CLOSED due to the submitted documentation and applicable analysis which has been conducted in order to verify parameters applicability efficiency defined.</p> <p>Resuming the sampling performed by the auditor team: Selected 54 SWH has been sampled, where it can be concluded that 52 of them were at that moment under operation (2 SWH could not be visited and there was no possibility of contacting with 1 of these 2 SWH affected household due to external reasons). According to definition of failure rate in MR Section G.3 (number of non-operating SWH / number of sampled SWH with valid results), the information of failure rate value sampled by the auditor team is 0% (more conservative than the ANME value)</p>
Conclusion	<p>ANME conclusions on 489 SWH sampling failure rate value were determined as an average of 6,7% (minimum value in CPA-6 = 0% failure rate, maximum value in CPA-4 = 10%).</p> <p>Comparing this value of 6.7% to value resulted from the verification of the auditor team on-site inspection, failure rate = 0%, it can be concluded that PP applied conservative sampling criteria. As a result, PP sampling criteria is regarded as validated and correct, and the PP's records are acceptable. This has enabled the verification team to assess the accuracy and completeness of reported monitoring results, to verify the correct application of the approved monitoring methodology and the determination of the emission reductions. In addition the applicable parameters required by the monitoring methodology AMS.I.C, ver: 17 and the management system were assessed during the site visit.</p> <p>Please refer to Appendix 5 to find more information regarding the Audit team on-site inspections.</p>

I.5. Compliance with the calibration frequency requirements for measuring instruments

Means of verification	<p>Not required as per registered PoA-DD and CPA's.</p> <p>ANME counts with thermometer so that its technical support team may conduct periodically SWH's water temperature checking. This equipment does not require calibration.</p> <p>Regarding Ok value calculation, it has been applied as water temperature exit value 45°C, regarded as a conservative value.</p> <p>Document /43/ picture: Thermometer used by ANME Technicians.</p>
Findings	N/A
Conclusion	N/A

I.6. Assessment of data and calculation of emission reductions or net removals

I.6.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

Means of verification	<p>The verification team assessed whether the data and calculations of baseline GHG emission reductions achieved resulting from the registered CDM project activity. In accordance with the methodology AMS.I.C-Thermal energy production with or without electricity, version 17.</p> <p>The baseline emissions are calculated as follows:</p> $BE_y = (\sum_k N_k * Ok) * (\sum_i w_i * EFi / eff_i) * U * (1 - F_{x,y})$ <p>Where</p> <p>\sum_k = Sum over the SWH k installed in the SSC-CPA x</p> <p>N_k = Number of SWH k installed in the SSC-CPA x</p> <p>Ok = Estimated annual energy output of SWH k (MWh/y)</p> <p>k = SWH type</p> <p>\sum_i = Sum over the energy source i used in the baseline scenario</p> <p>$w_{i,x}$ = Weighting of water heater using energy source i11 in the baseline scenario for the SSC-CPA x (%)</p> <p>eff_i = Average efficiency of water heater using energy source i</p> <p>EF_i = Emission factor EF_i for energy source i (tCO2/MWh)</p> <p>i = Energy source: fossil fuels and electricity</p> <p>U = Usage rate of the SWH (all types) in the SSC-CPA x (%)</p> <p>$F_{x,y}$ = Failure rate of the SWH (all types) in the SSC-CPA x in year y (%)</p> <p>The data recorded in the Workbook package records for each of CPA's have been verified by the verification team (documents: /24/, /13/, /14/, /15/, /16/, /17/, /18/, /19/, /20/ and /25/. The recorded data have also been crosschecked with referred data sources (i.e. PROSOL Database, SOLO database, IPCC and National Tourism Bureau of Tunisia). Defaulted value used for baseline GHG emissions calculation has been verified against the data source. The calculation process as well as all assumptions used in the calculation of the baseline GHG emissions has been verified against the methodology and the registered updated PDD. The verification team also re-produced the calculation to confirm the correctness of the baseline GHG emissions calculation.</p>
Findings	<p>The calculation tool, i.e. the ER Calculation spreadsheet clearly and transparently describes the calculation of baseline GHG emissions.</p> <p>As a result of verification of the baseline GHG emissions calculation process, the verification team confirmed that all the parameters required for the determination of the emission reductions have been included in the Monitoring Report and ER calculation spreadsheet and are consistent with the applied methodology AMS-I.C version 17.0 and the monitoring plan contained in the registered CPA-DD (CPA-1 has been updated, document /23/). The parameters are complete in this monitoring period.</p>

	<p>After verifying the reported figures with the raw data sources, it's confirmed that the values of the parameters from the raw data sources are consistent with those quoted in the ER calculation spreadsheet and the Monitoring Report. The verification process for the same has been clearly described in section E.6.2 of the report. The reported data of the monitored parameters have been crosschecked against other evidences than from the raw data records to confirm the appropriateness of the values.</p> <p>The verification team re-produced the calculation process in the ER calculation spreadsheet and confirmed that the methods and formulae used to obtain the baseline emissions are appropriate. The calculation has been done in accordance with the methods and formulae described in the registered monitoring plan and applicable methodology. Total emission reductions during the monitoring period have been rounded down to an integer.</p> <p>The verification team confirms that the assumptions, emission factors and default values (ex-ante values) from PDD used in the emission reductions calculation during the monitoring period have been correctly justified. All the emission factors and default values are explicitly mentioned in the final CDM-POA-MR.</p>
Conclusion	<p>The verification team concluded that:</p> <ul style="list-style-type: none"> - A complete set of data for calculating the baseline GHG emissions are available during this monitoring period; - Reported electricity data for calculating baseline GHG emissions have been cross-checked against electricity sales invoices; - Appropriate methods and formulae for calculating baseline GHG emissions have been followed; - Assumptions, emission factors and default values that were applied in the calculations have been justified.

I.6.2. Calculation of project GHG emissions or actual net GHG removals by sinks

Means of verification	The calculation process of the project GHG emissions has been verified against the methodology and the registered updated CPA-DD.
Findings	The project emission (PE _y) is zero as the project activity is a SWH generation project without any fossil fuel consumption. Thus no project emissions are envisaged from the project activity.
Conclusion	The project GHG emissions during this monitoring period are 0: according to AMS.I.C, no project emissions need to be taken into account. Therefore, PE _y = 0 tCO ₂

I.6.3. Calculation of leakage GHG emissions

Means of verification	The calculation process of the leakage GHG emissions has been verified against the methodology and the registered updated CPA-DD.
Findings	According to the Methodology AMS-I.C, there will be no leakage caused by the Project activity. Thus leakage is 0.
Conclusion	SWH are not transferred from another activity, so no leakage is to be considered. Therefore LE _y = 0 tCO ₂

I.6.4. Summary of calculation of GHG emission reductions or net GHG removals by sinks

Means of verification	The calculation process of the GHG emission reductions has been verified against the methodology and the registered updated CPA-DD.
Findings	<p>The GHG emission reductions equal to the baseline GHG emissions minus the project GHG emissions and the leakage GHG emissions.</p> <p>Consideration of materiality: The project is a small-scale PoA; as such, a 5 percent materiality threshold is applied as per VVSv09.0 §§ 361(c). To develop the materiality analysis, the auditor team verifies a representative sample of the total records of data captured through manual procedure, of the total monitored registers and of the on-site sampling approach was applied to inspect the project activity.</p> <p>During the site inspections and cross-checking procedures and sheets, no errors, omissions or misstatements were identified in manual procedures.</p> <p>Therefore, Applus+ LGAI confirms that the project activity data and information was checked and verified that the ER calculation is free from any potential error / omission /misstatement accordance to verification plan.</p>
Conclusion	<p>The verification team confirmed that the GHG emission reductions during this monitoring period have been correctly calculated and reported.</p> <p>Emission reductions calculation $ER_y = BE_y - PE_y - LE_y$ </p> <p>Where $ER_y = \text{Emission reductions in year } y \text{ (tCO}_2\text{)}$ $BE_y = \text{Baseline emissions in year } y \text{ (tCO}_2\text{)}$ $PE_y = \text{Project emissions in year } y \text{ (tCO}_2\text{)} = 0 \text{ tCO}_2$ $LE_y = \text{Leakage in year } y \text{ (tCO}_2\text{)} = 0 \text{ tCO}_2$ </p> <p>Consequently: $ER_y = BE_y$ </p>

Specific-case CPA reference number	Baseline emissions or baseline net GHG removals by sinks (tCO ₂ e)	Project emissions or actual net GHG removals by sinks (tCO ₂ e)	Leakage (tCO ₂ e)	GHG emission reductions or net GHG removals by sinks (tCO ₂ e)		
				Results achieved in the period up to 31 December 2012	Results achieved in the period from 1 January 2013 onwards	Results achieved in the entire monitoring period
4659-0001	22,800.0	-	-	10,276.0	12,524.0	22,800.0
4659-0002	9,022.0	-	-	1,363.0	7,659.0	9,022.0
4659-0003	9,691.0	-	-	1,465.0	8,226.0	9,691.0
4659-0004	9,857.0	-	-	1,490.0	8,367.0	9,857.0
4659-0005	10,731.0	-	-	1,622.0	9,109.0	10,731.0
4659-0006	10,505.0	-	-	1,588.0	8,917.0	10,505.0
4659-0007	7,995.0	-	-	181.0	7,814.0	7,995.0
4659-0008	9,547.0	-	-	-	9,547.0	9,547.0
Total	90,148.0	-	-	17,985.0	72,163.0	90,148.0

I.6.5. Comparison of actual GHG emission reductions or net GHG removals by sinks with estimates in included specific-case CPA

Means of verification	The verification team confirmed the calculation of actual GHG emission reductions in the CDM-POA-MR during the first commitment period and the period from 01/01/2013 onwards.
Findings	Whole GHG emission reductions of this monitoring period are within first commitment period and from 01/01/2013 onwards.
Conclusion	Whole GHG emission reductions of this monitoring period are within first commitment period and from 01/01/2013 onwards. Therefore, in the CDM-POA-MR the presentation of GHG emission reductions within first commitment period and from 01/01/2013 onwards is correct.

Specific-case CPA reference number	Value estimated in ex ante calculation in the included CPA-DD(s)	Actual values achieved by the specific-case CPA(s) during this monitoring period
4659-0001	26,368.0	22,800.0
4659-0002	10,126.0	9,022.0
4659-0003	11,879.0	9,691.0
4659-0004	12,621.0	9,857.0
4659-0005	13,152.0	10,731.0
4659-0006	11,750.0	10,505.0
4659-0007	8,984.0	7,995.0
4659-0008	9,716.0	9,547.0
Total	104,596.0	90,148.0

I.6.6. Remarks on difference from estimated value in registered PDD

Means of verification	The verification team verified the explanation in the CDM-POA-MR of the difference from the estimated value in the registered updated CPA-DD.
Findings	<p>The actual emission reductions are lower than the values estimated in the registered CPA-DD which should be considered in the normal range. This difference comes from two main reasons :</p> <p>1) Removal of SWH provided by 2 supplier's (due to loss of accreditation, Shamsy & SIAME) and 2) Failure rate applied to CPA population.</p>
Conclusion	The actual emission reductions are lower than the values estimated in the registered PDD, which has been explained in the CDM-POA-MR. The verification team confirmed the explanation is appropriate.

Appendix 1. Abbreviations

Abbreviations	Full texts
ACM	Approved Consolidated Methodology
AM	Approved Methodology
AMS	Approved Methodology Small Scale
ANME	Agence Nationale pour la Maîtrise de l'Energie
Applus+ LGAI	LGAi Technological Center, S.A. (Applus). DOE CDM-0032
BM	Build Margin
CAR	Corrective Action Requested
CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CER	Certified Emission Reduction
CM	Combined Margin
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
DNA	Designated National Authority
DOE	Designated Operational Entity
EF	Emission Factor
EIA	Environmental Impact Assessment
FAR	Forward Action Request
FSR	Feasibility Study Report
GHG	Greenhouse Gas(es)
IPPC	Intergovernmental Panel on Climate Change
IRL	Information Reference List
IRR	Internal Rate of Return
KP	Kyoto Protocol
MP	Monitoring Plan
CDM-POA-MR	Monitoring Report
NGO	Non-Governmental Organization
OM	Operational Margin
PP	Project Participant
SWH	Solar Water Heater
UNFCCC	United Nations Framework Convention for Climate Change
VVS	Validation and Verification Standard

Appendix 2. Competence of team members and technical reviewers

WORK TEAM MEMBER	TECHNICAL ROLES	SHORT PRESENTATION
Miquel Sitjes Cabanas	CDM Technical Manager and Lead Auditor for the assessment of this PoA	<p>CDM-PoA-MR. Miquel Sitjes Cabanas has a Bachelor Science degree in Chemistry by the Universidad de Barcelona – Spain (1975). He has 15 years of experience in a Spanish chemical group company specialized in the manufacturing of raw chemical products, where he worked as the Manager of Production and Quality and Environmental Control. He also worked in the Spanish pharmaceutical industry for 7 years as Quality, Manufacturing and Environmental Manager.</p> <p>Currently, he works for Applus+ LGAI Technological Center since 1999.</p> <p>Since 2006, he is the Technical Manager of Applus+LGAi, working under quality, and environmental standards such as ISO 9001, ISO 14001, GHG Verification, CDM, VCS and GS.</p> <p>He is qualified as Lead Auditor and Technical Reviewer under sectoral scopes 1 and 13.</p>
Simon Shen	CDM Technical Reviewer for this PoA	<p>CDM-PoA-MR. Simon Shen has a Master Degree in Thermal Energy Engineering and a Bachelor Degree in Environmental Engineering. Simon is a qualified Lead Auditor and Technical Reviewer appointed by Applus+ LGAI for the GHG project assessment. He is based on Shanghai. He has several years of work experience in environmental protection field. Before he joined Applus+ LGAI, he had been worked for TÜV SÜD as a GHG Validator/Verifier and ISO 9001/14001 Lead Auditor for 3.5 years. Simon has been working for Applus since 2010.</p> <p>He is qualified as Lead Auditor and Technical Reviewer under sectoral scopes 1 and 13 by our DOE.</p> <p>Simon is a world widely appreciated lead auditor/technical reviewer within CDM activity.</p>
Ms. Natalia Rodrigo	CDM Auditor in Training (Trainee)	<p>Ms. Natalia Rodrigo Vega has a Bachelor's Degree on Environmental Engineering and Master's Degree on Environmental and Quality Management System (under ISO 9001 and 14001).</p> <p>She Works in Applus Environmental and Quality Management Systems Department since March 2012, being specially involved on technical support tasks related to CDM-VCS and GS Standards, among others (i.e GHG verification and Proyecto Clima)</p>

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
Basic Documents (Monitoring Report, Project Design Documents, Previous Validation Report)				
/01/	ANME	Monitoring report Ver01	ver 1.0, date 25/06/2015)	PP
/22/	ANME	Monitoring report Ver02 (file: MR_MP#1_PoA-4659_0001-0008_10NOV2015_CLEAN VERSION)	Ver 2.0 date 10/11/2015	PP
/47/	ANME	Monitoring report Ver04	Ver 4.0 date 29/03/2017	PP
/02/	ANME	POA-DD design document registered	(Version 6, 16/02/2011)	PP
/03/	ANME	Generic CPA design document	(Version 5, 16/02/2011)	PP
/04/	ANME	CPA-DD 1 real case (registered)	(version 5, 16/02/2011)	PP
/23/	ANME	CPA-DD 1 real case (updated after this verification, file: UPDATED2016_CPA-DD-01 real case CLEAN)	(versión 6, CLEAN VERSION 29/09/2016 & version 6.1	PP
/05/	ANME	CPA-DD 2	(version 3, 16/07/2012)	PP
/06/	ANME	CPA-DD 3	(version 3, 16/07/2012)	PP
/07/	ANME	CPA-DD 4	(version 3, 16/07/2012)	PP
/08/	ANME	CPA-DD 5	(version 3, 16/07/2012)	PP
/09/	ANME	CPA-DD 6	(version 3, 16/07/2012)	PP
/10/	ANME	CPA-DD 7	(version 2, 29/11/2012)	PP
/11/	ANME	CPA-DD 8	(version 2, 29/11/2012)	PP
/12/	TUV SUD	Validation Report PoA (TUV SUD)	Ver 4, 25/02/2011	UNFCCC WorkFlow
/13/	ANME	WB_MP#1_PoA-4659_0001 (Excel sheet)	(Date 19/06/2015)	PP
/24/	ANME	WB_MP#1_PoA-4659_0001_10NOV2015 (Updated)	Date 10/11/2015	PP
/14/	ANME	WB_MP#1_PoA-4659_0002	Date 19/06/2015	PP
/15/	ANME	WB_MP#1_PoA-4659_0003	Date 19/06/2015	PP
/16/	ANME	WB_MP#1_PoA-4659_0004	Date 19/06/2015	PP
/17/	ANME	WB_MP#1_PoA-4659_0005	Date 19/06/2015	PP
/18/	ANME	WB_MP#1_PoA-4659_0006	Date 19/06/2015	PP
/19/	ANME	WB_MP#1_PoA-4659_0007	Date 19/06/2015	PP
/20/	ANME	WB_MP#1_PoA-4659_0008	Date 19/06/2015	PP
/21/	ANME	WB_summary_MP#1_PoA-4659_0001-0008	Date 19/06/2015	PP

/25/	ANME	WB_summary_MP#1_PoA-4659_0001-0008_10NOV2015 UPDATED	Date 10/11/2015	PP
References and requirements at UNFCCC/IPCC/etc.				
--	UNFCCC	VVS, Version 09.0	20/02/2015	UNFCCC
--	UNFCCC	PS, Version 09.0	20/02/2015	UNFCCC
/26/	UNFCCC	AMS-I.C. (version 17.0.0): // EB54_repan09_AMS-I.C_ver17 (applicable methodology to this PoA)	25/11/2005	UNFCCC
--	UNFCCC	Guidance to Complete "Monitoring Report Form (F-CDM-MR), Version 05.1" as accordance with the Attachment "Instructions for filling out the monitoring report form"	04/05/2015	UNFCCC
--	UNFCCC	Tool to calculate the emission factor for an electricity system (Version 02.2.1)	29/09/2011	UNFCCC
--	IPCC	IPCC Guidelines Vol. 2	Year 2006	IPCC
/37/	UNFCCC	Standard - Sampling and surveys for CDM PA and PoA V4.1	28/11/2013	UNFCCC
/38/	UNFCCC	Guideline - Sampling and surveys for CDM PA and PoA V3.0	04/10/2013	UNFCCC
/46/	UNFCCC	Tool to calculate the emission factor for an electricity system (annex 1)	29/09/2011	UNFCCC
Project implementation information				
/27/		File SWH example		PP
/28/		% ancien mode de chauffage - CPA1		PP
/29/		RetScreen13		PP
/30/		IPCC 2006 page 24-25		PP
/31/		CL5_IPCC 2006_value transformation		PP
/32/		Rapport technique Calculation production SWH kWh-y		PP
/35/		Tourisme tunisien en chiffres 2008.tif		PP
/36/		ra_steg_2005		PP
/39/		fiche_controle		PP
/40/		fiche_validation_echantillonnage		PP
/42/		solo_2000_doc		PP
/43/		Thermometer		PP
/44/		STEG Electricity Retrospective Statistics 2000-2010.		PP
/45/		STEG – Statistiques Rétrospectives d'Electricité 1997-2007.		PP
Procedures and standards				
/41/		ANME procedure visites control Prosol	15/09/2014	PP
Legislative Conformance				
/47/		Decree 2009-362- <i>Tunisian Industry and Energy Ministry Definition of grants regarding energy management sector,</i>		
Others (Evidences CAR – CL)				
/33/		CAR1_OK_values_check_10NOV2015_v2	10/11/2015	PP
/34/		CL8_etat_modele	10/11/2015	PP

Appendix 4. Clarification requests, corrective action requests and forward action request

Findings Overview Summary

Type	CAR	CL	FAR
Total Number raised	01 (Closed: 1)	09 (Closed:9)	00

Table 1. Remaining FAR from validation and/or previous verification: NOT APPLIED

FAR ID	xx	Section no.	Date: DD/MM/YYYY
Description of FAR			
CME response			Date: DD/MM/YYYY
Documentation provided by the CME			
DOE assessment			Date: DD/MM/YYYY

Table 2. CL from this verification

Type:	<input type="checkbox"/> CAR	<input checked="" type="checkbox"/> CL	<input type="checkbox"/> FAR	Number:	#01															
Raised by:	Miquel Sitjes Cabanas (LA) Natalia Rodrigo (A in T)		Ref. to checklist in table 1&2: Section 2.4 // Parameters obtained through external sources and accounting data		Section : 2.4															
Description of the audit finding				Date:	28/09/2015															
<p>The PP is requested to submit the source of data, named as <i>Prosol database, ex-ante</i> in order to verify parameters applicability efficiency defined within $w_{i,x}$ (%) calculation sheet, as follows:</p> <table border="1"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Source</th> </tr> </thead> <tbody> <tr> <td>Energy source i</td> <td></td> <td>$w_{i,x}$ (%)</td> </tr> <tr> <td>LPG</td> <td>57.9%</td> <td rowspan="4">Prosol database, ex-ante</td> </tr> <tr> <td>natural gas</td> <td>6.9%</td> </tr> <tr> <td>grid electricity</td> <td>8.7%</td> </tr> <tr> <td>other</td> <td>26.5%</td> </tr> </tbody> </table>						Parameter	Value	Source	Energy source i		$w_{i,x}$ (%)	LPG	57.9%	Prosol database, ex-ante	natural gas	6.9%	grid electricity	8.7%	other	26.5%
Parameter	Value	Source																		
Energy source i		$w_{i,x}$ (%)																		
LPG	57.9%	Prosol database, ex-ante																		
natural gas	6.9%																			
grid electricity	8.7%																			
other	26.5%																			
Project Participant's response				Date:	02/10/2015															
<p>PP has submitted to audit team referred justification to above mentioned parameters application, resulted from <i>Prosol database, ex-ante</i>, within an e-mail, where it is clearly explained their applicability.</p>																				
Documentation provided as evidence by Project Participant																				
<p>Formal email where it clearly justify and supported the parameters applicability efficiency defined within $w_{i,x}$ calculation sheet.</p>																				
Auditor's assessment comment				Date:	02/10/2015															
<p>Data information included within the submitted documentation is regarded as enough and sufficient to support the parameters applicability efficiency defined within $w_{i,x}$ (%) calculation sheet.</p>																				
Conclusion by Lead Auditor				Date:	02/10/2015															
<p>CL 1 is CLOSED due to the submitted documentation and applicable analysis which has been conducted in order to verify parameters applicability efficiency defined within $w_{i,x}$ (%) calculation sheet.</p>																				

Type:	<input type="checkbox"/> CAR	<input checked="" type="checkbox"/> CL	<input type="checkbox"/> FAR	Number:	#02															
Raised by:	Miquel Sitjes Cabanas (LA) Natalia Rodrigo (A in T)		Ref. to checklist in table 1&2: Section 2.4 // Parameters obtained through external sources and accounting data		Section : 2.4															
Description of the audit finding				Date:	28/09/2015															
The PP is requested to submit the source of data, named as <i>RETScreen</i> , <i>ex-ante</i> in order to verify parameters applicability efficiency defined within eff_i (%) calculation sheet, as follows:																				
<table border="1"> <thead> <tr> <th>Parameter</th> <th>Value</th> <th>Source</th> </tr> </thead> <tbody> <tr> <td>Energy source <i>i</i></td> <td></td> <td>eff_i (%)</td> </tr> <tr> <td>LPG</td> <td>86%</td> <td rowspan="4">RETScreen, ex-ante</td> </tr> <tr> <td>natural gas</td> <td>86%</td> </tr> <tr> <td>grid electricity</td> <td>94%</td> </tr> <tr> <td>other</td> <td>100%</td> </tr> </tbody> </table>						Parameter	Value	Source	Energy source <i>i</i>		eff_i (%)	LPG	86%	RETScreen, ex-ante	natural gas	86%	grid electricity	94%	other	100%
Parameter	Value	Source																		
Energy source <i>i</i>		eff_i (%)																		
LPG	86%	RETScreen, ex-ante																		
natural gas	86%																			
grid electricity	94%																			
other	100%																			
Project Participant's response				Date:	02/10/2015															
PP has submitted the respective database where typical Seasonal Efficiency (%) is defined per each residential water heating system type regarding fuel class (i.e. natural gas or propane, oil, electricity).																				
Documentation provided as evidence by Project Participant																				
RETScreen International // Solar Water Heater. Project Model: Typical values of residential heating system efficiencies.																				
Auditor's assessment comment				Date:	02/10/2015															
Data information included within the submitted documentation is regarded as enough and sufficient to support the parameters applicability efficiency defined within eff_i (%) calculation sheet.																				
Conclusion by Lead Auditor				Date:	02/10/2015															
CL 2 is CLOSED due to the submitted documentation and applicable analysis which has been conducted in order to verify parameters applicability efficiency defined within eff_i (%) calculation sheet																				

Type:	<input type="checkbox"/> CAR <input checked="" type="checkbox"/> CL <input type="checkbox"/> FAR	Number:	#03														
Raised by:	Miquel Sitjes Cabanas (LA) Natalia Rodrigo (A in T)	Ref. to checklist in table 1&2: Section 2.4 // Parameters obtained through external sources and accounting data	Section : 2.4														
Description of the audit finding		Date:	28/09/2015														
<p>The PP is requested to clarify within applicable Monitoring Report (MR), that regarding the Data/ Parameter named as eff_i, it is also needed to include the applicable % rate of other sources of energy, identified as OTHERS. In concrete terms, page 10 of MR, version 1, <i>Section G, Data and Parameters, G.1, Data and parameters fixed ex ante, at registration, inclusion or renewal of crediting period:</i></p> <table border="1"> <tr> <td>Data/parameter</td> <td>eff_i</td> </tr> <tr> <td>Unit</td> <td>%</td> </tr> <tr> <td>Description</td> <td>Average efficiency of a water heater using energy source i</td> </tr> <tr> <td>Source of data</td> <td>RETScreen</td> </tr> <tr> <td>Value(s) applied</td> <td>LPG 86% NG 86% ELEC 94% SOLAR 94%</td> </tr> <tr> <td>Choice of data or measurement methods and procedures</td> <td>/</td> </tr> <tr> <td>Purpose of data</td> <td>Calculation of baseline emissions</td> </tr> </table>				Data/parameter	eff_i	Unit	%	Description	Average efficiency of a water heater using energy source i	Source of data	RETScreen	Value(s) applied	LPG 86% NG 86% ELEC 94% SOLAR 94%	Choice of data or measurement methods and procedures	/	Purpose of data	Calculation of baseline emissions
Data/parameter	eff_i																
Unit	%																
Description	Average efficiency of a water heater using energy source i																
Source of data	RETScreen																
Value(s) applied	LPG 86% NG 86% ELEC 94% SOLAR 94%																
Choice of data or measurement methods and procedures	/																
Purpose of data	Calculation of baseline emissions																
Project Participant's response		Date:	16/11/2015														
<p>The parameter table for eff_i in the Monitoring Report was updated. It now includes the value applied for OTHERS (100%). This applied value represents the most conservative scenario.</p>																	
Documentation provided as evidence by Project Participant																	
MR_MP#1_PoA-4659_0001-0008_10NOV2015_track change.pdf																	
Auditor's assessment comment		Date:	20/01/2016														
<p>Data information included within the submitted documentation is regarded as enough and sufficient, the Values applied for OTHERS has been included in updated MR and matches with the value of the Calculation Sheet-1.</p>																	
Conclusion by Lead Auditor		Date:	20/01/2016														
CL-3 is CLOSED due to the submitted documentation and applicable corrections are found correct.																	

Type:	<input type="checkbox"/> CAR <input checked="" type="checkbox"/> CL <input type="checkbox"/> FAR		Number:	#04		
Raised by:	Miquel Sitjes Cabanas (LA) Natalia Rodrigo (A in T)	Ref. to checklist in table 1&2: Section 2.4 // Parameters obtained through external sources and accounting data	Section : 2.4			
Description of the audit finding		Date:	28/09/2015			
The PP is requested to clarify EF_i value for the energy type named as OTHERS within CPA-1 (as well as within its applicable calculation sheet). Please refer to below table for additional clarifications:						
Parameter	Value	Source	Value	Source	Value	Source
Energy source <i>i</i>		w_{i,x} (%)		eff_i (%)		EF_i (tCO₂/MWh)
LPG	57.9%	Prosol database, ex-ante	86%	RETScreen, ex-ante	0.227	2006 IPCC Guidelines for National Greenhouse Gas Inventories
natural gas	6.9%		86%		0.202	
grid electricity	8.7%		94%		0.550	
other	26.5%		100%		0.288	
Project Participant's response		Date:	28/09/2015			
PP has explained to audit team that the applicable value of 0,288 given to EF_i was accordingly justified and clarified within applicable CPA-DD, which has been already approved and registered by UNFCCC. In addition, it has been clarified that this value is resulted from weighted statistics applied for LPG, natural gas and grid electricity. Furthermore, it has been added 3% regarding SWH application. All of this has been explained within already registered PoA-DD.						
Documentation provided as evidence by Project Participant						
No additional documentation is required given that the calculations of this value are found within applicable calculations sheet.						
Auditor's assessment comment		Date:	28/09/2015			
Explanations are regarded as sufficient and enough to technically support the applicability of aforementioned value.						
Conclusion by Lead Auditor		Date:	28/09/2015			
Due to the technical justifications, CL 4 is CLOSED						

Type:	<input type="checkbox"/> CAR <input checked="" type="checkbox"/> CL <input type="checkbox"/> FAR		Number:	#05			
Raised by:	Miquel Sitjes Cabanas (LA) Natalia Rodrigo (A in T)	Ref. to checklist in table 1&2: Section 2.4 // Parameters obtained through external sources and accounting data	Section : 2.4				
Description of the audit finding		Date:	28/09/2015				
The PP is requested to submit to audit team referred 2006 IPPC Guidelines for National Greenhouse Gas Inventories in order to give sufficient evidence of the EF_i values which have been defined for LPG and Natural Gas.). Please refer to below table for additional clarifications:							
Parameter	Value	Source	Value	Source	Value	Source	
Energy source i	$w_{i,x}$ (%)		eff_i (%)		EF_i (tCO ₂ /MWh)		
LPG	57.9%	Prosol database, ex-ante	86%	RETScreen, ex-ante	0.227	2006 IPCC Guidelines for National Greenhouse Gas Inventories	
natural gas	6.9%		86%		0.202		
grid electricity	8.7%		94%		0.550		as per CPA-DD
other	26.5%		100%		0.288		as per CPA-DD
Project Participant's response		Date:	02/10/2015				
PP has submitted to audit team referred justification to abovementioned parameters application, resulted from the document 2006 IPPC Guidelines for National Greenhouse Gas Inventories, where it also has been included a short explanation of this application methodology. Furthermore, conversion factor document has been submitted.							
Documentation provided as evidence by Project Participant							
CL5_IPCC 2006_value transformation.pdf							
Auditor's assessment comment		Date:	02/10/2015				
Data information included within the submitted documentation is regarded as enough and sufficient to support the parameters applicability efficiency defined within EF_i calculation sheet.							
Conclusion by Lead Auditor		Date:	02/10/2015				
CL 5 is CLOSED due to the submitted documentation and applicable analysis which has been conducted in order to verify parameters applicability efficiency defined within EF_i calculation sheet.							

Type:	<input type="checkbox"/> CAR	<input checked="" type="checkbox"/> CL	<input type="checkbox"/> FAR	Number:	#06				
Raised by:	Miquel Sitjes Cabanas (LA) Natalia Rodrigo (A in T)		Ref. to checklist in table 1&2: Section 2.4 // Parameters obtained through external sources and accounting data		Section : 2.4				
Description of the audit finding				Date:	28/09/2015				
The PP is requested to submit to audit team applicable justifications in order to give sufficient evidence of the Usage Rate values which have been defined and refer to <i>National National Tourism Bureau of Tunisia, ex-ante</i> . Please refer to below table for additional clarifications:									
Parameter	Value	Source	Value	Source	Value	Source			
Energy source <i>i</i>	$w_{i,x}$ (%)		eff_i (%)		EF_i (tCO ₂ /MWh)		$w_{i,x} * EF_i / eff_i$ (tCO ₂ /MWh)	$\sum_i (w_{i,x} * EF_i / eff_i)$ (tCO ₂ /MWh)	
LPG	57.9%	Prosol database, ex-ante	86%	RETSscreen, ex-ante	0.227	2006 IPCC Guidelines for National Greenhouse Gas Inventories	0.153	0.296	
natural gas			86%		0.202		0.016		
grid electricity	6.9%		94%		0.550		as per CP - DD		0.051
other	8.7%		100%		0.288		as per CPA-DD		0.076
	26.5%								
Usage rate U	99%	National Tourism Bureau of Tunisia, ex-ante							
Project Participant's response				Date:	02/10/2015				
PP has submitted to audit team referred justification to abovementioned parameters application, resulted from the document, named as <i>Le Tourisme Tunisien en chiffres, 2008</i> (Tunisian Tourism in figures, 2008). In concrete terms, referred data is found on Table for <i>Durée de Séjour Hôtelier des résidents</i> (hotel accommodation duration for residents).									
Documentation provided as evidence by Project Participant									
PP submits an extract from <i>Le Tourisme Tunisien en chiffres, 2008</i> (Tunisian Tourism in figures, 2008). In concrete terms, referred data is found on Table for <i>Durée de Séjour Hôtelier des résidents</i> (hotel accommodation duration for residents) where this value justifies further calculations on usage rate value. This parameter has a value of 0.6 %, but PP has decided to select the value of 1% in order to assure more conservative data parameters.									
Auditor's assessment comment				Date:	02/10/2015				
Data information included within the submitted documentation is regarded as enough and sufficient to support the parameters applicability efficiency defined.									
Conclusion by Lead Auditor				Date:	02/10/2015				
CL 6 is CLOSED due to the submitted documentation and applicable analysis which has been conducted in order to verify parameters applicability efficiency defined.									

Type:	<input type="checkbox"/> CAR <input checked="" type="checkbox"/> CL <input type="checkbox"/> FAR	Number:	#07
Raised by:	<i>Miquel Sitjes Cabanas (LA)</i> <i>Natalia Rodrigo (A in T)</i>	Ref. to checklist in table 1&2: <i>Section 2.4 // Parameters obtained through external sources and accounting data</i>	Section : 2.4
Description of the audit finding		Date:	28/09/2015
The PP is requested to clarify to audit team why an additional sampling was conducted under the global process of sampling monitoring (please refer to calculation sheet named as WB_MP#1_PoA-4659_000n, being <i>n</i> the applicable n° of registered CPA-DD).			
Project Participant's response		Date:	28/09/2015
Due to lack of availability of the beneficiaries of SWH sorted in the first sampling, the minimum number of SWH per CPA to be visited and checked, following the "Standard - Sampling and surveys for CDM PA and PoA" (v4.1, EB74 Annex 6, modified by EB 80, Annex 7), was not reached. A second sampling campaign was then necessary. All the results of the two sampling campaigns are clearly stated in the Excel spread sheets WB_MP#1_PoA-4659_000n and were considered in the determination of the parameter "Failure rate - Fx,y			
Documentation provided as evidence by Project Participant			
No documentation is required for the closing of CL, given that 1 st and 2 nd sampling have been included within WB_MP#1_PoA-4659_000n.			
Auditor's assessment comment		Date:	28/09/2015
Given clarifications and explanations are regarded as sufficient to support the necessity of performing a second sampling conduction.			
Conclusion by Lead Auditor		Date:	28/09/2015
CL 7 is CLOSED due to the submitted documentation and applicable analysis which has been conducted in order to verify parameters applicability efficiency defined.			

Type:	<input type="checkbox"/> CAR	<input checked="" type="checkbox"/> CL	<input type="checkbox"/> FAR	Number:	#08
Raised by:	<i>Miquel Sitjes Cabanas (LA)</i> <i>Natalia Rodrigo (A in T)</i>	Ref. to checklist in table 1&2: <i>Section 2.4 // Parameters obtained through external sources and accounting data</i>		Section : 2.4	
Description of the audit finding				Date:	
The PP is requested to clarify to audit team how the parameter Ok (Annual energy output of the SWH k) - MWh/y has been calculated (please refer to WB_MP#1_PoA-4659_000n).					
Project Participant's response				Date:	16/11/2015
<p>As already explained within the validation report, Ok is the estimated annual energy output of SWH k and is used in the calculation of the fuel consumption of the technologies that would have been used in the ab-sence of the CPA and PoA.</p> <p>The values used for the annual energy output of a SWHk are the output of a recognised SWH model. The model currently used was developed by theCentre Scientifique et Technique du Bâtiment (Scientific and Technical Centre for the Construction Industry–CSTB) and is called SOLO.</p> <p>The software SOLO can be accessed online :</p> <ul style="list-style-type: none"> Online version: http://www.tecsol.fr/st_uk/default-uk.htm Download: <p>The two platforms use the same calculation method (SOLO) and similar input values. The input values are discussed in Annex 3 of the PoA-DD and are, for most of them, specific for each SWH and taken from the manufacturer's specifications for each SWH.</p> <p>SOLO has been used since the beginning of the PoA and will be used until the end of it. The software is not updated annually and is based on reliable historical data. As such, ex-ante application of the software is appropriate and there is no need to monitor the applied soft-ware data.</p>					
Documentation provided as evidence by Project Participant					
CAR8_etat_modele.pdf					
Auditor's assessment comment				Date:	20/01/2016
Data information included within the submitted documentation is regarded as enough and sufficient; the model of calculation of factor Ok with the SOLO platform has been submitted and explained.					
Conclusion by Lead Auditor				Date:	20/01/2016
CL-8 is CLOSED due to the submitted documentation are found correct.					

Type:	<input type="checkbox"/> CAR <input checked="" type="checkbox"/> CL <input type="checkbox"/> FAR	Number:	#09
Raised by:	<i>Miquel Sitjes Cabanas (LA)</i> <i>Natalia Rodrigo (A in T)</i>	Ref. to checklist in table 1&2: <i>Section 2.4 // Parameters obtained through external sources and accounting data</i>	Section : 2.4
Description of the audit finding		Date:	02/10/2015
The PP is requested to describe more clearly how the complete process of <i>Emissions Reductions Calculation (ER_y)</i> is made within MR document, as it was defined within applicable and already registered PoA-DD. In concrete terms, section H, Calculation of GHG emission reductions or net GHG removals by sinks (pages 18 & 19 of MR, version 1).			
Project Participant's response		Date:	16/11/2015
A paragraph was included at the beginning of chapter H.1. in the Monitoring Report transparently explaining the way how the emission reductions have been calculated (ER = BE - PE - L).			
Documentation provided as evidence by Project Participant			
MR_MP#1_PoA-4659_0001-0008_10NOV2015_track change.pdf			
Auditor's assessment comment		Date:	20/01/2016
Data information included within the submitted documentation is regarded as enough and sufficient, in the updated MR is defined the method of calculation of GHG emission reductions or net GHG removals by sinks			
Conclusion by Lead Auditor		Date:	20/01/2016
CL-9 is CLOSED due to the submitted documentation and applicable corrections are found correct.			

Type:	<input type="checkbox"/> CAR <input checked="" type="checkbox"/> CL <input type="checkbox"/> FAR	Number:	#10
Raised by:	<i>Miquel Sitjes Cabanas (LA)</i> <i>Natalia Rodrigo (A in T)</i>	<i>Post Registration Changes</i>	Section : H.3.1. Temporary deviations from the registered monitoring plan, monitoring methodology or standardized baseline
Description of the audit finding		Date:	14/02/2017
It was also found that the PoA-DD and CPA-DDs stated that the number of operating units were needed to be determined through an annual verification implemented by the ANME. However, the monitoring report and verification report stated that the monitoring frequency of the failure rate of the SWH ($F_{x,y}$) is once per monitoring period (paragraph 299 of the VVS version 09.0) (CL#10)			
Project Participant's response		Date:	29/03/2017
The PoA-DD and CPA-DDs state that the number of operating units is to be determined through an annual verification implemented by the ANME.			

<p>However, the monitoring report and verification report state that the monitoring frequency of the failure rate of the SWH ($F_{x,y}$) is once per monitoring period. As a result, a temporary deviation was opened.</p> <p>This choice was made because, following the sample plan randomly established, the monitoring implies a high number of visits on the field all around Tunisia. Moreover, besides the fact that it's very costly, Tunisia's post revolution context made the access to many region very difficult. All these reasons made the monitoring on an annual basis quite impossible.</p> <p>The approach taken has been proven to be conservative since the failure rate used for the whole monitoring period is the one related to the year that immediately precede the end of the monitoring period which can only be higher or equal to the failure rate of the first years of the monitoring period following the registration of the PoA and the inclusion of the CPAs.</p>		
Documentation provided as evidence by Project Participant Corrected MR, version 4 dated 29/03/2017 (section E).		
Auditor's assessment comment	Date:	24/04/2017
<p>In line with CL#10 scope, PP justified that the reason of selecting a monitoring frequency of the failure rate of the SWH ($F_{x,y}$) as once per monitoring period, is in line with the following: The randomly established plan implied a high number of on-site visits within Tunisia. Moreover, besides the fact that it was very costly, Tunisia's post revolution context made the access to many region very difficult. All these reasons made the monitoring plan on an annual basis quite impossible.</p> <p>The approach taken has been proven to be conservative since the failure rate used for the whole monitoring period is the one related to the year that immediately precede the end of the monitoring period which can only be higher or equal to the failure rate of the first years of the monitoring period following the registration of the PoA and the inclusion of the CPAs.</p> <p>The justification provided by PP is proved as realistic and conservative, in line with VVS 9. In addition, no affections to additionality, project design or ER calculations are found.</p>		
Conclusion by Lead Auditor CL#10 is closed	Date:	24/04/2017

Table 3. CAR from this verification

Type:	<input checked="" type="checkbox"/> CAR	<input type="checkbox"/> CL	<input type="checkbox"/> FAR	Number:	#01
Raised by:	<i>Miquel Sitjes Cabanas (LA)</i> <i>Natalia Rodrigo (A)</i>	Ref. to checklist in table 1&2: <i>Section 2.4 // Parameters obtained through external</i>		Section : 2.4	

	<i>in T)</i>	<i>sources and accounting data</i>	
Description of the audit finding		Date:	16/11/2015
<p>The PP is requested to clarify why given values for O_k (<i>Annual energy output of each type of SWH, MWh/y</i>) differ from data defined within applicable and registered CPA's, which also means, they differ from the O_k data parameters contained within the calculation sheet named as <i>WB_MP#1_PoA-4659_000n, sheet 5, SWH data</i>. This issue is also found within Monitoring Report (MR), version 1.</p> <p>e.g:</p> <p>Model 1901 CPA-1, $O_k = 2.278$ MWh/y and calculation sheet = 2.278 CPA-2, 1.4 MWh/y and calculation sheet = 1.4 In MR = 2.278</p> <p>Model 1902 CPA-1, $O_k = 2.000$ MWh/y and calculation sheet = 2.000 CPA-2, 2.538 MWh/y and calculation sheet = 2.538 In MR = 2.538</p> <p>Model 2002 CPA-2, 1.658 MWh/y and calculation sheet = 1.658 In MR = 2.006</p>			
Project Participant's response		Date:	PENDING
<p>All OK values which were used in the emission reduction calculations have been verified in different cross-checks. Each check is in detail described below. The resulting updates in the excel calculations are explained as well. Finally the additional proof documents have been listed.</p> <p><u>CHECK 1: WB CPA "1" versus WBs CPA "2-8":</u></p> <ul style="list-style-type: none"> By comparing the OK values for each SWH model between all the Workbooks CPA1-8 inconsistencies for 17 SWH models have been found. (305, 1401, 1402, 1403, 1801, 1802, 1803, 1804, 1901, 1902, 2002, 2101, 2102, 2103, 2104, 2201, 2202). More precisely it could be concluded that inconsistencies occurred exclusively for CPA1. <p><u>CHECK 2: ER PDD ex-ante CPA "1" versus ER PDD ex-ante CPA "2-8":</u></p> <ul style="list-style-type: none"> By comparing the OK values for each SWH model between all ER PDD ex-ante CPA1-8 the identical inconsistencies have been found as in CHECK 1. <p><u>CHECK 3: OK value currently listed in ANNEX MR:</u></p> <ul style="list-style-type: none"> In a next step it was checked which OK value was listed in the Annex of the Monitoring Report version 1, CPA 1 (meaning incorrect value) or CPA2-8 (meaning correct value). In total 10 incorrect values have been listed. (305, 1801, 1803, 1804, 1901, 2002, 2101, 2102, 2104, 2201). These 10 values have been updated. <p><u>Conclusion for correct value: always "2-8":</u></p> <ul style="list-style-type: none"> For the sake of clarity, all OK values for CPA2-8 are correct. A more detailed proof was provided. The emission reduction calculations for CPA1 as well as the global ER value have been updated accordingly. <p><u>Conclusion for CAR1:</u></p> <ul style="list-style-type: none"> Update WB CPA1 with correct values was done. Update WB summary with correct values was done. Update MR Annex with correct values was done. 			
Documentation provided as evidence by Project Participant			
<ul style="list-style-type: none"> CAR1_OK_values_check_10NOV2015_v2.xlsx WB_MP#1_PoA-4659_0001_10NOV2015.xlsx WB_summary_MP#1_PoA-4659_0001-0008_10NOV2015.xlsx MR_MP#1_PoA-4659_0001-0008_10NOV2015_track change.pdf 			

Auditor's assessment comment	Date:	20/01/2016
Data information included within the submitted documentation is regarded as enough and sufficient, the Ok parameter has been reviewed and updated in cases of mistake, for each SWH, in updated MR, updated CPA-1 and updated Calculation Sheet-1. The ER have been re-calculated in Calculation Sheet-1, Sheet Summary, MR and found correct.		
Conclusion by Lead Auditor	Date:	20/01/2016
CAR-1 is CLOSED due to the submitted documentation and applicable corrections are found correct.		

Table 4. FAR from this verification: NO FAR's

FAR ID	xx	Section No.		Date: DD/MM/YYYY
Description of FAR				
CME response				Date: DD/MM/YYYY
Documentation provided by the CME				
DOE assessment				Date: DD/MM/YYYY

Appendix 5

Sampling conducted by LGAI Applus+ AT

<div> <div>Team 1: Mr. Lassoued Hayder (PROSOL Technician) Ms. Mouna Besbes (ANME Representative) Ms. Natalia Rodrigo Vega (Applus Auditor in training)</div> <div>29/09/2015</div> </div>												
SWH n.	Region	N° CPA	CIN	SWH Provider	Climatology	N° residents	Address	SWH location, inclination and orientation	Number of showers per day	Usage of other sources of energy	SWH's Monitoring control	User's satisfaction
1	Grand Tunis	1	480686	1 - SOFTEN	Sunny	6	13 AV.MUSTAPHA ABDESSELEM 1004 MENZAH 5	OK	1	Gas Natural	1 / year	High
2	Grand Tunis	1	1069207	1 - SOFTEN	Sunny	5	57 RUE MANOUBI JARJAR 1013 MENZAH 9	OK	2	N/A	2 / year	High
3	Grand Tunis	2	633596	1 - SOFTEN	Sunny	5	25 RUE HEDI MKADDEM 1013 MENZAH 9 B	OK	1	Electricity	1 / year	High
4	Grand Tunis	4	536221	1 - SOFTEN	Sunny	3	LOTIS NESRINE LOT 1 15 - 2091 JATDIN EL MENZAH 2	OK	2	N/A	1 / year	High
5	Grand Tunis	5	7327885	1 - SOFTEN	Sunny	1	18 RUE BIR LAARAYESS 2022 KALAAT ANDALOUS	OK	1	N/A	1 / year	High
6	Grand Tunis	6	96526	1 - SOFTEN	Sunny	3	LOT AGHA LOT 17 2076 BHAR LAZREG1	OK	1	Gas Natural and Electricity	No yet	High
7	Grand Tunis	3	536664	1 - SOFTEN	Sunny	5	IMP N° 3 A COTE DE VITATOP CHOTRANA 2036 ARIANA	OK	1	Gas Natural	1 / year	High
8	Grand Tunis	5	2853433	3 - SIER	Sunny	3	23 RUE ESSAYDA EL MENZEH 9C	OK	2	Gas Natural	1 / year	High
9	Grand Tunis	7	255055	30 - FAYZER	Sunny	3	CTE IBN EL FOURAT LA MARSA	OK	1	Gas Natural	2 / year	High
30/09/2015												
SWH n.	Region	N° CPA	CIN	SWH Provider	Climatology	N° residents	Address	SWH location, inclination and orientation	Number of showers per day	Usage of other sources of energy	SWH's Monitoring control	User's satisfaction
1	Nabeul	2	6334802	1 - SOFTEN	Cloudy	2	RUE BOUKSSILA ROUTE LA PLAGE - 8025 HAMMAM GHEZZ	OK	2	N/A	No yet	High
LP	Nabeul	3	6256644	1 - SOFTEN	Cloudy	7	LATRACH BIR BOUREGBA HAMMAMET 8042	OK	2	LPG	1 / year	High
3	Nabeul	4	74509	1 - SOFTEN	Cloudy	6	RTE DE LA MOSQUEE MRAZKA 8050 HAMMAMET	OK	5	Gas Natural and Electricity	2 / year	High
4	Nabeul	6	1843913	1 - SOFTEN	Cloudy	5	GMISSA 8031 TAKELESSA	OK	4	N/A	1 / year	High
5	Nabeul	CPA6	6286914	1 - SOFTEN	Cloudy	4	COTE DEKHILI ZAROUK 8063 BOUHENDAYA	OK	3	N/A	1 / year	High
6	Nabeul	5	560051	30 - FAYZER	Cloudy	4	EL WATTIYA 8080	OK	1	LPG	1 / year	High
7	Nabeul	5	1796503	30 - FAYZER	Cloudy	5	RUE KSAR HLEL KELIBIA	OK	2	N/A	1 / year	High
8	Nabeul	6	1707159	35 - Energie	Cloudy	5	EL MANCHER SIDI DJIDI NABEUL	OK	2	LPG	1 / year	High
9	Nabeul	3	6413684	2 - SINES	Cloudy	6	Lezdine Menzel Temim Nabeul	OK	3	LPG	1 / year	High
01/10/2015												
SWH n.	Region	N° CPA	CIN	SWH Provider	Climatology	N° residents	Address	SWH location, inclination and orientation	Number of showers per day	Usage of other sources of energy	SWH's Monitoring control	User's satisfaction
1	Grand Tunis	4	1511928	1 - SOFTEN	Sunny	4	CITE JARDIN 11 RUE DE PARIS 2090 BEN AROUS	OK	3	LPG	1 / year	High
2	Grand Tunis	8	62214	1 - SOFTEN	Sunny	3	ZARIA BIR EZANGUA MORNAG BEN AROUS	OK	2	Electricity	1 / year	High
3	Grand Tunis	8	4450123	1 - SOFTEN	Sunny	2	CITE EL HANA NASSEN BEN AROUS	OK	2	Electricity	1 / year	High
4	Grand Tunis	1	261183	1 - SOFTEN	Sunny	4	SNIT TYPE IMAN LOT 5 EL -2074 MOUROUJ 1	OK	4	LPG	1 / year	High
5	Grand Tunis	1	1158570	1 - SOFTEN	Sunny	3	RUE ABOU ATTAHIA N°8 -2013 HAMMAM CHAT	OK	5	Electricity	1 / year	High
6	Grand Tunis	5	1901950	1 - SOFTEN	Sunny	6	22 RUE BONE MOUROUJ 4 2074 BEN AROUS	OK	2	Electricity	1 / year	High
7	Grand Tunis	6	593694	1 - SOFTEN	Sunny	3	29 RUE EL MEKTEB 2033 SIDI REZIG	OK	2	N/A	1 / year	High
8	Grand Tunis	1	5199837	18 - BSI	Sunny	5	10 RUE MUSTAFA MOHSEN BORJ LOUZIR	OK	2	N/A	1 / year	High
9	Grand Tunis	5	106864	35 - Energie	Sunny	2	23 RUE IMEN SAHNOUN RADES	OK	1	Electricity	1 / year	High

Team 2: Mr. Fawzi Mbarek (PROSOL Technician)
Ms. Inga Fischer (SOLVAY Representative)
Mr. Miquel Sitjes
Canabas (Lead Auditor and Supervisor)

29/09/2015

SWH n.	Region	N° CPA	CIN	SWH Provider	Climatology	N° residents	Address	SWH location, inclination and orientation	Number of showers per day	Usage of other sources of energy	SWH's Monitoring control	User's satisfaction
1	Nabeul	1	30	1 - SOFTEN	Sunny	5	LOT EL KETARA N°12 ET 15 -8020 SOLIMAN RIADH	OK	2	GN	1 / year	High
2	Nabeul	1	34	1 - SOFTEN	Sunny	4	HENCHIR BEN TALEB KALBIA -8030 GROMBALIA	OK	1	LPG	1 / year	High
3	Nabeul	2	14	1 - SOFTEN	Sunny	6	LATRECH 8042 BIR BOUREGBA	OK	1	Others	1 / year	High
4	Nabeul	6	36	1 - SOFTEN	Sunny	5	BORJ GOUISS 8040 BOUARGOUB	OK	2	LPG	1 / year	Medium
5	Nabeul	7	12	1 - SOFTEN	Sunny	4	LATRACH 8042 BIR BOURAGBA	OK	1	LPG	1 / year	High
6	Nabeul	7	13	1 - SOFTEN	Sunny	5	TOUTA 8030 GROMBALIA	OK	1	LPG	1 / year	Medium
7	Nabeul	5	8	1 - SOFTEN	Sunny	5	BORJ GOUIS 8040 BOUARGOUB	OK	2	LPG	1 / year	High
8	Nabeul	7	31	18 - BSI	Sunny	6	MZIRA BIR BOURAGUBA	OK	1	Others	1 / year	High
9	Nabeul	5	33	18 - BSI	Sunny	5	EL MARJA SOLIMAN	OK	2	LPG	1 / year	High

30/09/2015

SWH n.	Region	N° CPA	CIN	SWH Provider	Climatology	N° residents	Address	SWH location, inclination and orientation	Number of showers per day	Usage of other sources of energy	SWH's Monitoring control	User's satisfaction
1	GRAND TUNIS	1	4	1 - SOFTEN	Cloudy	1	39 - ETS BEN MOKHTAR FAOUZI	OK	2	Others	1 / year	High
2	GRAND TUNIS	4	4	1 - SOFTEN	Cloudy	4	217 - Ferchichi Sabeur	OK	2	LPG	1 / year	High
3	GRAND TUNIS	6	32	1 - SOFTEN	Cloudy	1	822 - BOUALLEGUE SAMEH	OK	1	Electricity	1 / year	Medium
4	GRAND TUNIS	8	4	1 - SOFTEN	Cloudy	4	3 - FERCHICHI HEDI	OK	1	LPG	1 / year	Medium
5	GRAND TUNIS	8	32	1 - SOFTEN	Cloudy	6	217 - Ferchichi Sabeur	OK	2	Electricity	1 / year	High
6	GRAND TUNIS	3	3	1 - SOFTEN	Cloudy	1	346 - Sté PROTECH Ben Sassi	OK	2	LPG	1 / year	High
7	GRAND TUNIS	2	5	18 - BSI	Cloudy	3	659 - STE TRAVAUX VOIRIES	OK	1	LPG	1 / year	High
8	GRAND TUNIS	8	5	46 - SEN	Cloudy	4	1106 - JAZIRI MAROUEN	OK	2	LPG	1 / year	High
9	GRAND TUNIS	1	5	12 - TECH-SOL	Cloudy	4	401 - DOUZANI AZMI	OK	2	LPG	1 / year	High

01/10/2015

SWH n.	Region	N° CPA	CIN	SWH Provider	Climatology	N° residents	Address	SWH location, inclination and orientation	Number of showers per day	Usage of other sources of energy	SWH's Monitoring control	User's satisfaction
1	Bizerte	2	12	1 - SOFTEN	Sunny	1	14 RUE HASEN NOURI - 7080 MENZEL JEMIL	OK	1	LGN + Electricity	1 / year	Medium
2	Bizerte	4	35	1 - SOFTEN	Sunny	4	CITE DU NORD MENZEL ABDERAHMAN 7035 BIZERTE	OK	1	Others	1 / year	High
3	Bizerte	2	7	1 - SOFTEN	Sunny	1	204 CITE EL HANA - 7003 BIZERTE	OK	1	LPG	1 / year	High
4	Bizerte	2	21	1 - SOFTEN	Sunny	4	RUE MOHAMED SALEH DRIDI EL ALIA	OK	2	Others	1 / year	Medium
5	Bizerte	3	7	3 - SJER	Sunny	6	GARIA METLINE	OK	1	LPG	1 / year	High
6	Bizerte	8	10	18 - BSI	Sunny	1	AVENUE HABIB BOURGUIBA AOUSJA	OK	1	LPG	1 / year	High
7	Bizerte	8	31	46 - SEN	Sunny	3	SIDI SELEM BIZERTE	OK	2	Others	1 / year	High
8	Bizerte	1	4	2 - SINES	Sunny	4	142, Rue Essamar Elbahira	OK	1	LPG	1 / year	High
9	Bizerte	5	10	35 - Energie	Sunny	4	LOG N°39 NOUVELLE CITE ZARZOUNA 7021	OK	2	Others	1 / year	High

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
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