JCM Verification Report Form

A. Summary of verification

A.1. General Information

Title of the project	Lao PDR Energy Efficient Datacenter Project (LEED)
Reference number	LA001
Monitoring period	06/02/2017 – 31/08/2018
Date of completion of the monitoring report	05/09/2018
Third-party entity (TPE)	TPE-LA-002 Japan Quality Assurance Organization
Project participant contracting the TPE	Mitsubishi UFJ Morgan Stanley Securities Co., Ltd.
Date of completion of this report	12/09/2018

A.2 Conclusion of verification and level of assurance

Overall verification opinion	☒ Positive ☐ Negative
☒ Unqualified opinion	Based on the process and procedure conducted, JQA (TPE's name) provides reasonable assurance that the emission reductions for Lao PDR Energy Efficient Datacenter Project (LEED) (project name) ✓ Are free of material errors and are a fair representation of the GHG data and information, and ✓ Are prepared in line with the related JCM rules, procedure, guidelines, forms and other relevant documents
(If overall verification opinion is negative, please check below and state its reasons.) ☐ Qualified Opinion ☐ Adverse opinion ☐ Disclaimer	<State the reasons>

A.3. Overview of the verification results

Item	Verification requirements	No CAR or CL remaining
The project implementation with the eligibility criteria of the applied methodology	The TPE determines the conformity of the actual project and its operation with the eligibility criteria of the applied methodology.	☒
The project implementation against the registered PDD or any approved revised PDD	The TPE assesses the status of the actual project and its operation with the registered/validated PDD or any approved revised PDD.	☒
Calibration frequency and correction of measured values with related requirements	If monitoring Option C is selected, the TPE determines whether the measuring equipments have been properly calibrated in line with the monitoring plan and whether measured values are properly corrected, where necessary, to calculate emission reductions in line with the PDD and Monitoring Guidelines.	☒
Data and calculation of GHG emission reductions	The TPE assesses the data and calculations of GHG emission reductions achieved by/resulting from the project by the application of the selected approved methodology.	☒
Avoidance of double registration	The TPE determines whether the project is not registered under other international climate mitigation mechanisms.	☒
Post registration changes	The TPE determines whether there are post registration changes from the registered PDD and/or methodology which prevent the use of the applied methodology.	☒

Authorised signatory: Mr. ☒ Ms. ☐

Last name: Asada First name: Sumio

Title: Senior Executive

Specimen signature: [redacted] Date: 12/09/2018

B. Verification team and other experts

	Name	Company	Function*	Scheme competence*	Technical competence*	On-site visit
Mr. ☐ Ms. ☒	Sachiko Hashizume	JQA	Team leader	☒	Authorized	☒
Mr. ☒ Ms. ☐	Tadashi Yoshida	JQA	Internal reviewer	☒	Authorized	☐

Please specify the following for each item.

* *Function: Indicate the role of the personnel in the validation activity such as team leader, team member, technical expert, or internal reviewer.*
* *Scheme competence: Check the boxes if the personnel have sufficient knowledge on the JCM.*
* *Technical competence: Indicate if the personnel have sufficient technical competence related to the project under validation.*

C. Means of verification, findings and conclusions based on reporting requirements

C.1. Compliance of the project implementation and operation with the eligibility criteria of the applied methodology

<Means of verification>

The project has been registered as a JCM project on 31 July 2017, with applying JCM Approved Methodology LA_AM001 " Installation and operation of energy-efficient data center (DC) in the Lao PDR, Version 01.0" under the scheme of Joint Crediting Mechanism between the Lao People's Democratic Republic (herein after referred to as Lao PDR) and Japan.

The project participant from Lao PDR is Ministry of Science and Technology, Lao P.D.R (herein after referred to as MOST) and the project participants from Japan are Toyota Tsusho Corporation (herein after referred to as TTC) , Internet Initiative Japan Inc. (herein after referred to as IIJ), and Mitsubishi UFJ Morgan Stanley Securities Co., Ltd. (herein after referred to as MUMSS).

The project introduces the first full-fledged container based datacenter with the total power receiving capacity of 500kW at Vientiane Capital in Lao PDR. Compared to the conventional building type DCs, the module type DC achieves higher energy efficiency by utilizing indirect-outside-air-cooling system which ventilate the inside heat using the outside air. Depending on the condition of outside air, the air cooling block of the DC selects its operation mode by taking advantage of outside air throughout the year, leading to the greater energy saving. In addition, unlike traditional building type DCs entire structure needs to be built at the beginning,

module type or container based DC can be expanded based on the data processing demand. Such flexibility is considered as a suitable feature for the DC to be built in developing countries.

The JCM website indicates the starting date of the project operation is 17 January 2017 and this monitoring period starts from 6 February 2017. It was confirmed that project participants started the monitoring after the installation and commissioning of project DC and the training of the optimum operation and maintenance of the container-type data-center to the DC team of MOST.

Through a review of relevant documents, the verification team assessed whether the project implementation and operation after the starting date of project operation complied with the eligibility criteria of the applied methodology during the monitoring period. After the desk review, an on-site assessment was conducted on 18 October 2017. The verification team conducted a physical inspection and interviews with project participants and other entities involved in the project as listed in Section F of this verification report.

The assessment results regarding the eligibility criteria are summarized as below:

JCM_LA_AM001_ver01.0

Criterion 1

The project DC is newly introduced, highly efficient with designed PUE value under 1.3.

Through reviewing supporting documents and interview during the on-site inspection, the project information of Criterion 1 described in the PDD, was checked and confirmed as below with a satisfactory result:

- The designed PUE value for the project DC is 1.28 as described in "Designed PUE (dPUE) of LEED Datacenter".
- The project DC was newly introduced as the first official DC in Lao PDR which deploys modern technology from Japan.

In the meantime, it was confirmed through the verification that the actual PUE value of the period is 1.5, which is not under 1.3. Therefore, the verification team raised CL02 and it was described and finally resolved in the next sub-section, “Findings”, of this report.

Criterion 2

The container is highly air-tight with IEC60529 value of IP-54 or higher based on manufacturer's inspection results.

It was confirmed through checking the name plate of the container during the on-site inspection that the container installed is manufactured by NML ECL. The results of the inspection conducted by NML ECL were provided and it shows that the IP level of the containers used for LEED project achieves (gives) IP-54. As a result, the verification team confirmed that the project implementation and operation complied with above eligibility criteria.

Criterion 3
The project DC installs IT equipment that has operating temperature recommended by manufacturer with upper limit of 40 degrees C or higher.

Through reviewing the system configuration guide of "NEC Express5800R/R120f-1E", it was confirmed that the operating temperature recommended is 10 °C to 40 °C. During the on-site inspection, it was confirmed that the above mentioned IT equipment is used for the project DC. It was also confirmed that other IT equipment including network device (NW) and storage are installed in the project DC. It was confirmed that the upper limit of operating temperature recommended by manufacturer of each NW and storage equipment is 40 °C or higher. As a result, the verification team confirmed that the project implementation and operation complied with above eligibility criteria.

Criterion 4
Ozone Depletion Potential (ODP) of the refrigerant used for the project DC is zero.

Through reviewing the user's manual of "Indirect outside air conditioning unit Model: FCA-40A", it was confirmed that the refrigerant is HFC410a (R410a). The ODP of R410a is zero. During the on-site inspection, it was confirmed that the above mentioned air conditioning unit is used for the project DC. It was also confirmed that there are no other cooling equipment used for the project DC. As a result, the verification team confirmed that the project implementation and operation complied with above eligibility criteria.

Criterion 5
A plan for not releasing refrigerant used for project DC is prepared.

Through reviewing the operation manual for the project DC it was confirmed that it

include a prevention measure of refrigerant leakage. Through reviewing a report template for periodic maintenance check, it was confirmed that the prevention plan is based on "Guide of simplified fluorocarbons leak check", which is established by Japanese government in conjunction with "Act on rational use and proper management of fluorocarbons".

In the course of assessment of the implementation status of the above mentioned prevention plan, a CL was raised and project participants provided a response to the CL. Through reviewing the response, it was confirmed that the prevention plan was implemented appropriately. Therefore, the verification team confirmed that the project implementation and operation complied with above eligibility criteria.

<Findings>

(Issue raised as CL01)

Regarding the eligibility criterion 5, it was confirmed that the PP prepared an operation manual for the project datacenter including a prevention measure of refrigerant leakage. Through reviewing a report template for periodic maintenance check, it was confirmed that the prevention plan is based on "Guide of simplified fluorocarbons leak check" which is established by Japanese government in conjunction with "Act on rational use and proper management of fluorocarbons".

In order to confirm whether this criterion is satisfied in the JCM project, it is requested to clarify the implementation status of the prevention plan.

(Summary of the response on CL01)

According to the "Guide of simplified fluorocarbons leak check", it is specified that the simplified fluorocarbons leak check shall be conducted at least once in every three months. In addition to the simplified leak check, a routine inspection needs to be conducted at least once a year for the air conditioners with compressor/motor of rated output 50kW or higher.

To fulfill the eligibility criterion 5, and the above conditions stipulated in the "guide", the project participants prepared an operation manual in which monthly simplified leak check and annual inspection of air conditioners are included.

Since the start of the monitoring period in Feb 2017, the project participants conducted weekly site patrols at which the simplified leak check was also conducted. The leak check was conducted more frequently than stipulated in the operation manual to avoid initial malfunctioning of the project at the start of the operation. A routine inspection was conducted in January 2018. A sample of weekly check sheet

was provided for review.

After confirming stable operation of the air conditioning units of the project, the project changed the frequency of simplified fluorocarbons leak check to monthly in October 2017. A series of record for monthly simplified leak check was provided for review. Through simplified leak check no indication of refrigerant leakage was observed. Next annual routine inspection is scheduled in October 2018.

(Assessment result of the responses on CL01)

Through reviewing the records of weekly and monthly simplified leak check and on-site inspection, it was observed that a leak check has implemented periodically and it has worked effectively by now in terms of a prevention of refrigerant leakage. Therefore, the verification team close this issue.

(Issue raised as CL02)

Regarding the eligibility criterion 1, It is requested to clarify the reason why the actual PUE value of the project DC during the period is 1.5 and it is not under 1.3, which is a design value of PUE as the threshold defined in the criterion 1.

(Summary of the response on CL02)

Because the utilization rate of the DC has not yet reached to its designed level, the designed PUE has not yet reached. The methodology is made to reflect the actual PUE in emission reduction calculation, not the design PUE. As such, the emission reduction is not overestimated based on the designed PUE.

(Assessment result of the responses on CL02)

It is eventually confirmed that the explanation by the PPs are reasonable

<Conclusion based on reporting requirements>

The verification team concluded that the actual project and its operation were in compliance with the eligibility criteria of the applied methodologies during this monitoring period.

C.2. Assessment of the project implementation against the registered PDD or any approved revised PDD

<Means of verification>

The verification team assessed the status of the actual project and its operation with the registered PDD by a desk review, an on-site visit and interviews. The assessment results are summarized as below;

[Physical features of the project]

Through the desk review, on-site visit and interview with project participants and relevant entities, it was confirmed that the project DC was constructed in December 2016 and handed over to MOST, by signing the Implementation document on site test of LEED on 17 January 2017.

[Monitoring points]

There are two parameters related to the GHG emission reductions of the project monitored by measuring equipment as below.

1. $EC_{PJ,P}$: Total electricity consumption of project DC during the period p

Through the on-site inspection, it was confirmed that the meters have been installed and managed by Electricite Du Laos (EDL).

2. $\Sigma EC_{IT,j,p}$: Sum of electricity consumption by IT equipment measured by electricity meters during the period p

Through the on-site inspection, it was confirmed that 48 electricity meters have been installed.

Detailed information on the monitoring data of these two monitoring points is described in Section C.4. Assessment of data and calculation of GHG emission reductions of this verification report.

[Monitoring structure]

Through the interview with project participants and relevant entities, it was confirmed that the monitoring structure was formed and operated in line with the registered PDD during the monitoring period.

The verification team confirms by means of an on-site visit for the first verification, that physical features of the project in the registered/validated PDD are in place and that the project participants have operated the project as per the registered/validated PDD.

<Findings>

No outstanding issue was raised.

<Conclusion based on reporting requirements>

The verification team concluded that the project implementation was in accordance with the registered PDD during the monitoring period, and no change was found from the registered PDD.

C.3. Compliance of calibration frequency and correction of measured values with related requirements

<Means of verification>

There are two monitoring parameters measured by electricity meters. The total electricity consumption of project DC during the period ($EC_{PJ,p}$) is measured by an electricity meter which is installed and managed by the electrical utilities of Lao PDR, Electricité du Laos (EDL). The applied methodology JCM_LA_AM001 does not require calibration by PP if the meters are installed and managed by the electrical utilities of Lao PDR. Therefore, the verification team confirmed that it is reasonable that PP has not calibrated the meter by themselves.

On the other hand, the electricity consumption by IT equipment during the period ($EC_{IT,i,p}$) is measured by electricity meters installed and managed by PP. The verification team confirmed the calibration records issued by Japan Electric Meters Inspection Corporation (JEMIC), and are valid until November 2023.

The verification team determined that the measuring equipment have been properly calibrated in line with the monitoring plan.

<Findings>

No outstanding issue was raised.

<Conclusion based on reporting requirements>

The verification team concluded that the calibration frequency was in compliance with related requirements. Therefore, no correction of the measured value was required.

C.4. Assessment of data and calculation of GHG emission reductions

<Means of verification>

The verification team assessed the data and calculation of GHG emission reductions achieved by the project as below;

(a) The corresponding Monitoring Report Sheet of the applied methodology has been used;

Through reviewing the draft monitoring report and the final monitoring report for the project, titled as "JCM_LA_AM001_ver01.0_LA001_MP1_20171011.xlsx" and "JCM_LA_AM001_ver01.0_LA001_MP1_feb2017_aug2018.xlsx" respectively, it was confirmed that the appropriate Monitoring Report Sheet of applied methodology has been used.

(b) A complete set of data for the monitoring period for all parameters monitored ex post was provided to the verification team in the form of several kinds of files.

Through the desk review and interview with the project participants, it was confirmed that these files contain the evidence and records for the electricity consumption of project DC. The character of each file is summarized as below;

1) LEED Monitoring Data.pdf

This type of file contains picture of the meter reading value of the measuring equipment at the project DC. The total electricity of project DC is measured by an electricity meter installed and managed by EDL. The electricity consumption of each IT equipment is monitored by an electricity meter installed and managed by project participants. As there are 48 sets of IT equipment, 48 electricity meters are recorded in this file with serial number and meter reading. The monitoring and creation of this monitoring data is conducted by a personnel of AMG group which is commissioned by MUMSS. At the end of every month, the personnel visits the project DC with member of DC team of MOST to conduct the monitoring. Project participants provided three sets of LEED Monitoring Data as below;

- LEED Monitoring Data (Feb-2017)_rev.pdf, which is the monitoring data of the beginning of the first monitoring period,
- LEED Monitoring Data (Dec-2017).pdf, which is the monitoring data of the end of 2017,
- LEED Monitoring Data (Aug-2018).pdf, which is the monitoring data of the end of the first monitoring period

2) Monitoring Form (LEED)(Dec-17).xlsx and Monitoring Form (LEED)(Aug-18).xlsx

These files contain tables to summarize and calculate EC_{PJ} (the total electricity consumption of project DC) and $\sum EC_{IT,i}$ (total electricity consumption by IT equipment) on monthly basis. JCM Monitoring Manager, MUMSS updates the file based on the monitoring data reported in LEED Monitoring Data.pdf every month. The Monitored values in the Monitoring Report Sheet (Input Sheet) are derived from this file.

(c) Information provided in the monitoring report has been checked with sources such as plant logbooks, inventories, purchase records, laboratory analysis;

The verification team reviewed all the above mentioned complete data set of the monitoring data. As a Monitoring Report Sheet should be prepared on yearly basis, there are two sets of Monitored value for each monitoring parameters.

Parameters	Monitored values	Method to check values in the monitoring report with sources
$EC_{PJ,p}$	For 06/02/2017-31/12/2017: 559.2MWh/p For 01/01/2018-31/08/2018: 423.2MWh/p	The verification team checked the meter reading value of the beginning and end of eachperiod against "LEED Monitoring Data" and the formulae and result of calculation of the total electricity consumption of project DC during the period in "Monitoring Form(LEED).xls".
$\sum EC_{IT,I,p}$	For 06/02/2017-31/12/2017: 384.06MWh/p For 01/01/2018-31/08/2018: 293.22MWh/p	The verification team checked the meter reading value of the beginning and end of each period against "LEED Monitoring Data.pdf" and the formulae and result of calculation of the Sum of electricity consumption by IT equipment of project DC during the period in "Monitoring Form(LEED).xls".

(d) Any assumptions used in emission calculations have been justified;

Through reviewing the Monitoring Report Sheets and interview with the PPs, it was confirmed that no assumption had been used in emission calculations and hence no justification was required.

(e) Appropriate emission factors, default values, and other reference values have been correctly applied.

Through reviewing the Monitoring Report Sheets and interview with the PPs, it was confirmed that appropriate emission factors, default values, and other reference values had been correctly applied.

<Findings>

No outstanding issues was raised.

<Conclusion based on reporting requirements>

The verification team concluded through assessment of data and calculation of GHG emission reductions that the reported values in the monitoring report were justified.

C.5. Assessment of avoidance of double registration

<Means of verification>

It was confirmed that a written confirmation from project participants regarding the registration under other international climate mitigation mechanisms were provided in the JCM Modalities of Communication Statement. In addition, through the interview with project participants, it was confirmed that the project has not been registered under any other mechanisms.

According to a form of declaration for avoidance of double registration in the JCM Modalities of Communication Statement, the declaration letter signed by the project participant's representative was submitted to the Joint Committee at the validation stage, and it was also cross-checked at the verification stage. In addition, through search on the website of the CDM and JI, it was confirmed that no project with similar technology and location had been registered in Lao PDR.

<Findings>

No outstanding issues are raised.

<Conclusion based on reporting requirements>

The verification team concluded that the project had not been registered under other international climate mitigation mechanisms.

C.6. Post registration changes

<Means of verification>

It was confirmed through the review of documents and the on-site assessment that the project had not been changed from the registered PDD and/or methodology.

<Findings>

No outstanding issue was raised.

<Conclusion based on reporting requirements>

The verification team concluded that the project had not been changed from the registered PDD and/or methodology.

D. Assessment of response to remaining issues

An assessment of response to the remaining issues including FARs from the validation and/or previous verification period, if appropriate

No remaining issues including FARs from the validation, and this is the first verification period, therefore this item is not applicable.

E. Verified amount of emission reductions achieved

Year	Verified Reference Emissions (tCO_2e)	Verified Project Emissions (tCO_2e)	Verified Emission Reductions (tCO_2e)
2017	429.7	312.8	116
2018	328.1	236.7	91
2019	N/A	N/A	N/A
2020	N/A	N/A	N/A
Total (tCO_2e)			207

F. List of interviewees and documents received

F.1. List of interviewees

- Souliya Sengdalavong, Deputy Director General, Information Technology Department, Ministry of Science and Technology, Lao PDR
- Sirilack Xayyabounsou, Director of Division, Information Technology Department, Ministry of Science and Technology, Lao PDR
- Souksamone Vongsauath, Deputy Director of Division, Information Technology Department, Ministry of Science and Technology, Lao PDR
- Pisa Ouansysomphou, Deputy Director of Division, Information Technology Department, Ministry of Science and Technology, Lao PDR
- Vilaxay Xaysita, Officer, Information Technology Department, Ministry of Science and Technology, Lao PDR
- Souphaphone Phetchalern, Project Manager, AMZ Goup
- Hiroshi Ueda, PS section 4 Manager, Professional Services Department, Internet Initiative Japan Inc.
- Daisuke Nishino, Project Manager, Toyota Tsusho Corporation
- Chumpol Tangdumrongvong, General Manager, Lao PDR Project Office, TTNetwork Integration (Thailand) Co.,ltd.
- Masahiro Kikuchi, Chief System Architect, Lao PDR Project Office, TTNetwork Integration (Thailand) Co.,ltd.
- Chisato Nakade, Senior Consultant, Clean Energy Finance Division, Mitsubishi UFJ Morgan Stanley Securities Co.,Ltd.
- Shigeru Ogawa, Consultant, Clean Energy Finance Division, Mitsubishi UFJ Morgan Stanley Securities Co.,Ltd.

F.2. List of documents received

1. Monitoring Report Sheet(draft) (JCM_LA_AM001_ver01.0_LA001_MP1_20171011.xlsx)
2. Monitoring Report Sheet(final) (JCM_LA_AM001_ver01.0_LA001_MP1_ feb2017_aug2018.xlsx)
3. JCM Approved Methodology LA_AM001 “Installation and operation of energy-efficient data center (DC) in the Lao PDR” (JCM_LA_AM001_ver01.0.pdf)
4. Form of Monitoring Plan Sheet and Monitoring Structure Sheet (LA_AM001) (JCM_LA_AM001_ver01.0.xlsx)
5. JCM Glossary of Terms (JCM_LA_Glossary_ver01.0)
6. JCM Guidelines for Developing Project Design Document and Monitoring Report (JCM_LA_GL_PDD_MR_ver03.0)
7. JCM Project Cycle Procedure (JCM_LA_PCP_ver03.0)
8. JCM Guidelines for Validation and Verification (JCM_LA_GL_VV_ver01.0)
9. Project Design Document, dated on 20/02/2017, ver.02.0 (JCM_LA001_PDD.pdf)
10. Monitoring Plan Sheet (LCH_LA001_MP.xlsx)
11. Validation Report, dated on 24/03/2017 (JCM_LA001_Val_Rep.pdf)
12. JCM Modalities and Communication Statement Form, dated on 26/12/2016 (JCM_LA001_MoC.pdf)
13. Article on the first data center in Laos, Vientiane Times, 30 November 2016
14. The manufacture's inspection results of IP value
15. The technical specification of IT equipment to be installed in the project DC
    "NEC Express5800/R120f-1E System Configuration Guide"
    "Data sheet for Cisco 890 Series Integrated Services Routers, Cisco 2900 Series Integrated Services Routers, Cisco Catalyst 2960-X Series Switches, Cisco Catalyst 3650 Series Switches"
    "Specifications for FAS8020 (strage array)"
16. Designed PUE (dPUE) of LEED Datacenter
    Indirect outside air conditioning unit Model: FCA-40A user's manual
17. Guide of simplified fluorocarbons leak check
18. Act on rational use and proper management of fluorocarbons
19. LEED Air conditioner maintenance manual
20. Template of LEED Air conditioner maintenance sheet
21. co-Izmo/I Single Line Diagram Location : Vientiane
22. Implementation Document Plan Site Test of LEED including facility list
23. LEED Monitoring Data (Feb-17),

LEED Monitoring Data (Dec-17),
LEED Monitoring Data (Aug-18),
Monitoring Form

24. Specification of electricity meter for measurement of total electricity consumption of IT equipment (ECIT,i)
25. Calibration certificate of the electricity meter for measurement of total electricity consumption of IT equipment (ECIT,i)
26. The plan and record of training to the operators in Lao PDR for the optimum operation and maintenance of the container-type data-center
27. Weekly Maintenance record of the container-type data-center
28. [LEED] Air Conditioner Maintenance Sheet for March-August 2018
29. Site patrol visual check sheet
30. LEED Service Center Audit Summary Report

Annex Certificates or curricula vitae of TPE's verification team members, technical experts and internal technical reviewers

Please attach certificates or curricula vitae of TPE's validation team members, technical experts and internal technical reviewers.

Statement of competence

JQA

Name: Ms. Sachiko Hashizume

Qualified and authorized by Japan Quality Assurance Organization.

Function

	Date of qualification
Validator	2015/11/20
Verifier	2015/11/20
Team leader	-

Technical area within sectoral scopes

	Date of qualification
TA 1.1. Thermal energy generation	2015/11/20
TA 1.2. Renewables	2015/11/20
TA 3.1. Energy demand	2015/11/20
TA 4.1. Cement and lime production	-
TA 4.6. Other manufacturing industries	-
TA 5.1. Chemical industry	-
TA 10.1. Fugitive emissions from oil and gas	-
TA 13.1. Solid waste and wastewater	2015/11/20
TA 14.1. Afforestation and reforestation	-

Statement of competence

JQA

Name: Dr. Tadashi Yoshida

Qualified and authorized by Japan Quality Assurance Organization.

Function

	Date of qualification
Validator	2014/12/22
Verifier	2014/12/22
Team leader	2014/12/22

Technical area within sectoral scopes

	Date of qualification
TA 1.1. Thermal energy generation	2014/12/22
TA 1.2. Renewables	2014/12/22
TA 3.1. Energy demand	2014/12/22
TA 4.1. Cement and lime production	2015/11/12
TA 4.6. Other manufacturing industries	2014/12/22
TA 5.1. Chemical industry	2014/12/22
TA 10.1. Fugitive emissions from oil and gas	2014/12/22
TA 13.1. Solid waste and wastewater	2014/12/22
TA 14.1. Afforestation and reforestation	-