

### JCM Verification Report Form

#### A. Summary of verification

##### A.1. General Information


Title of the project	Reducing GHG emission at Textile Factory of Luckytex (Thailand) Public Company Limited by Upgrading to Air-saving Loom
Reference number	TH002
Monitoring period	From 29/01/2016 to 31/10/2018
Date of completion of the monitoring report	26/02/2019
Third-party entity (TPE)	Lloyd's Register Quality Assurance Limited (LRQA)
Project participant contracting the TPE	Toray Industries, Inc.
Date of completion of this report	05/03/2019

##### A.2 Conclusion of verification and level of assurance

Overall verification opinion	<input checked="" type="checkbox"/> Positive <input type="checkbox"/> Negative
<input checked="" type="checkbox"/> Unqualified opinion	<p>Based on the process and procedure conducted, <i>Lloyd's Register Quality Assurance Limited (LRQA)</i> (TPE's name) provides reasonable assurance that the emission reductions for <i>Reducing GHG emission at Textile Factory of Luckytex (Thailand) Public Company Limited by Upgrading to Air-saving Loom</i> (project name)</p> <ul style="list-style-type: none"> <li>✓ Are free of material errors and are a fair representation of the GHG data and information, and</li> <li>✓ Are prepared in line with the related JCM rules, procedure, guidelines, forms and other relevant documents</li> </ul>
<p><i>(If overall verification opinion is negative, please check below and state its reasons.)</i></p> <input type="checkbox"/> Qualified Opinion <input type="checkbox"/> Adverse opinion <input type="checkbox"/> Disclaimer	<p>&lt;State the reasons&gt;</p> <p>Not applicable</p>

##### 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.	<input checked="" type="checkbox"/>
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.	<input checked="" type="checkbox"/>
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.	<input checked="" type="checkbox"/>
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.	<input checked="" type="checkbox"/>
Avoidance of double registration	The TPE determines whether the project is not registered under other international climate mitigation mechanisms.	<input checked="" type="checkbox"/>
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.	<input checked="" type="checkbox"/>

Authorised signatory:	Mr. <input checked="" type="checkbox"/>	Ms. <input type="checkbox"/>
Last name: Chiba	First name: Michiaki	
Title: Climate Change Manager - Asia & Pacific		
Specimen signature		Date: 05/03/2019

## B. Verification team and other experts

	Name	Company	Function*	Scheme competence*	Technical competence*	On-site visit
Mr. <input checked="" type="checkbox"/> Ms. <input type="checkbox"/>	Michiaki Chiba	LRQA Ltd.	Team leader	<input checked="" type="checkbox"/>	Technical competence authorised	<input checked="" type="checkbox"/>
Mr. <input checked="" type="checkbox"/> Ms. <input type="checkbox"/>	Ketan S. Deshmukh	LRQA Ltd.	Team member	<input type="checkbox"/>	N/A	<input checked="" type="checkbox"/>
Mr. <input type="checkbox"/> Ms. <input checked="" type="checkbox"/>	Kannika Thiemtad	LRQA Thailand	Host country expert	<input type="checkbox"/>	N/A	<input checked="" type="checkbox"/>
Mr. <input checked="" type="checkbox"/> Ms. <input type="checkbox"/>	Stewart Niu	LRQA China	Internal reviewer	<input checked="" type="checkbox"/>	N/A	<input type="checkbox"/>

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>

LRQA has determined during the verification process that the actual implementation and operation of the project has been conducted in conformance with the eligibility criteria of the applied methodology.

The project applied the approved methodology: JCM\_TH\_AM004\_ver01.0 Installation of energy saving air jet loom at textile factory, Version 01.0.

LRQA assessed by means of an on-site visit that the physical features of the project are in place and that the PPs have operated the project as per the eligibility criteria of the applied methodology. The steps taken to verify each eligibility criterion and the conclusions about implementation of the project are summarised as below.

Criterion 1: The project replaces existing air jet looms at a weaving factory with air jet looms equipped with energy saving technologies such as an optimized shape reed's tunnel of nozzles and a pressure sensor to measure air pressure of nozzles for optimization of compressed air

consumption of weft insertion.

Justification in the PDD: 119 air jet looms (model number “JAT810”) are installed to replace existing air jet looms at the weaving factory of Luckytex (Thailand) Public Company Limited. JAT810 is equipped with energy saving technologies such as an optimized shape reed’s tunnel of nozzles and a pressure sensor to measure air pressure of nozzles for optimization of compressed air consumption of weft insertion.

Steps taken for assessment: The verification team assessed the project documentation, technical specification, the commissioning report, and conducted physical on site assessment.

Conclusion: The verification team confirmed that the project replaced 119 existing air jet rooms at the weaving factory of Luckytex (Thailand) Public Company Limited with the upgraded model JAT810 equipped with energy saving technologies including an optimised shape reed’s tunnel of nozzles and a pressure sensor to measure air pressure of nozzles for optimisation of compressed air consumption of weft insertion. The requirements of criterion is met by the project.

Criterion 2: The air jet looms which are installed by the project reduce the specific air consumption by at least 15% compared with the reference air jet looms in line with the description in Section I of the methodology.

Justification in the PDD: The air jet looms which are installed by the project reduce the specific air consumption by more than 20% compared with the reference air jet looms in line with the description in Section I of the methodology.

Steps taken for assessment: The verification team assessed the project documentation, technical specification, the calculation of specific air consumption and the reduction rate, and conducted physical on site assessment.

Conclusion: The verification team confirmed that reduction rate of the specific air consumption of the project air jet looms model JAT810 from the reference air jet looms was determined ex-ante at 25.2% that is reduced more than 15% from the reference air jet looms as described in the approved methodology. The criterion is met by the project.

The verification team confirmed that the eligibility conditions are satisfied by the project by reviewing the supporting documents and the on site assessment.

The details of the persons interviewed and the documents reviewed are shown in the Section F of this report.

#### **<Findings>**

*Please state if CARs, CLs, or FARs are raised, and how they are resolved.*

No issue was raised to the requirements of this section.

#### **<Conclusion based on reporting requirements>**

*Please state conclusion based on reporting requirements.*

The verification team confirmed that the project has been implemented in conformity with the eligibility criteria of the applied methodology.

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

**<Means of verification>**

The project replaced 119 existing air jet rooms by the latest air-saving looms model JAT810 manufactured by Toyota Industries Corporation at the textile factory of Luckytex (Thailand) Public Company Limited at Amphur Phrapradaeng, Samutprakarn, Thailand. The JAT810 air jet loom has weft insertion system designed to reduce air pressure by air-saving reed, multi-tandem nozzle, and high efficiency sub nozzle.

The project is implemented by Luckytex (Thailand) Public Company Limited from the Kingdom of Thailand and Toray Industries, Inc. from Japan (the PPs). The start date of project operation is on 29/01/2016 and the expected operational lifetime of the project is for 7 years. The project receives financial support for JCM model projects from the Ministry of the Environment, Japan (MOE).

The verification team assessed the Monitoring Report (MR) that consists of Monitoring Report Sheet (MRS) parts of the Monitoring Spreadsheet and the supporting documents, conducted a physical site visit to assess the status of the actual project and its operation in accordance with the registered PDD. No revision to the registered PDD was requested.

The verification team determined through the verification process that the implementation and operation of the project has been in accordance with the description contained in the registered PDD. The verification team, by means of a desk review and an on-site visit, assessed that:

- all physical features of the JCM project described in the registered PDD are in place, and
- the PPs have operated the JCM project as per the registered PDD.

The MR follows the Monitoring Plan (MP) of the registered PDD that has been established based on the approved methodology. The parameter to be monitored ex-post is (1) AP<sub>PJ,i,j,p</sub> Amount of fabric woven by the project air jet loom type i at the project factory j during the period p (in m/p). All 119 units of project air jet looms are the same model JAT810 and installed in the same factory Mill No. 1 of Luckytex (Thailand) Public Company Limited. The length of product fabric is monitored by meter installed to each air jet loom. The monitoring follows the production instructions and the monitored data is cross-checked with the commercial data for accuracy.

The roles and responsibilities of the persons are described in the Monitoring Structure Sheet (MSS) in accordance with the requirements of the applied methodology.

Through the processes taken, CAR 1, CL 1 and CL 2 were raised as the resolution detailed below.

The details of the persons interviewed and the documents reviewed are shown in the Section F of this report.

**<Findings>**

*Please state if CARs, CLs, or FARs are raised, and how they are resolved.*

Grade / Ref: CAR 1

Nature of the issue raised: The Table 4 of the MRS was not completed with the monitoring period. The versions of MR should be given an identification when revised.

Nature of responses provided by the PPs: The PPs submitted the revised MR completed on 26/02/2019 for review by the verification team.

Assessment of the responses: The verification team confirmed that the revised MR has been completed with the monitoring period. The CAR was closed.

Grade / Ref: CL 1

Nature of the issue raised: The PPs were requested to clarify implementation of the procedures to keep the relevant data and information required for the verification and issuance be kept and archived electronically for two years after the final issuance of the credits.

Nature of responses provided by the PPs: The PPs confirmed the implementation of the procedures on keeping the data in the MSS of the MR with the detailed procedures.

Assessment of the responses: The verification team confirmed that the PPs have prepared detailed procedures and confirmed implementation during the monitoring period to ensure keeping of required data over the requested duration. The CL was closed.

Grade / Ref: CL 2

Nature of the issue raised: The PPs were requested to clarify the implementation of the monitoring procedures on responsibility of maintaining the monitoring equipment.

Nature of responses provided by the PPs: The PPs added information of the responsible person assigned for the role.

Assessment of the responses: The verification team confirmed that General Manager of Weaving Department was assigned to be responsible for the monitoring system. The CL was closed.

**<Conclusion based on reporting requirements>**

*Please state conclusion based on reporting requirements.*

The verification team confirmed that the project was implemented and operated in accordance with the registered PDD and no revision to the same was requested for the monitoring period.

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

#### <Means of verification>

The parameter No. (1) AP\_PJ,i,j,p applies the monitoring Option C but the meter used for monitoring of the parameter is not required calibration according to the requirements of the approved methodology and the registered MP.

The details of the persons interviewed and the documents reviewed are shown in the Section F of this report.

#### <Findings>

*Please state if CARs, CLs, or FARs are raised, and how they are resolved.*

No issue was raised to the requirements of this section.

#### <Conclusion based on reporting requirements>

*Please state conclusion based on reporting requirements.*

The verification team confirmed that regular calibration of the measuring equipment and correction to the measured values are not applied to the project.

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

#### <Means of verification>

The MR is developed using the MRS applied to the registered JCM project that is confirmed fulfilment of the requirements of the MRS of the applied methodology.

LRQA has determined that:

1. a complete set of data for the specified monitoring period is available,
2. information provided in the MR has been cross-checked with other sources such as plant log books, inventories, purchase records, laboratory analysis,
3. calculations of reference emissions (REs) and project emissions (PEs), as appropriate, have been carried out in accordance with the formulae and methods described in the MP and the applied methodology,
4. any assumptions used in emission calculations have been justified, and
5. appropriate emission factors, default values and other reference values have been correctly applied.

The sources of GHG emissions are electricity consumption by air compressors to generate compressed air and CO<sub>2</sub> emissions for the reference air jet looms to determine the reference emissions (REs) and electricity consumption by air compressors to generate compressed air and CO<sub>2</sub> emissions for the project air jet looms to determine the project emissions (PEs) in accordance with the applied methodology.

The REs are calculated by the specific electricity consumption of the air compressors at the project factory (SEC), the specific air consumption of the project air jet loom (SAC), the

reduction rate of SAC (RR), the amount of fabric woven by the project air jet loom (AP\_PJ) and CO2 emission factor for the consumed electricity (EF\_elec). SEC, SAC, RR, and EF\_elec are fixed ex-ante at the validation at 0.0864 kWh/Nm<sup>3</sup>, 1.41 Nm<sup>3</sup>/m, 25.2%, and 0.0005664 tCO<sub>2</sub>/kWh respectively.

The GHG emission reductions during the monitoring period (each for year 2016, 2017 and 2018) are calculated as:  $ER_p = RE_p - PE_p = \sum_j (SEC_j \times \sum_i (SAC_{PJ,i,j} \times AP_{PJ,i,j,p}) \div (1 - RR_{i,j}/100) \times EF_{elec,j}) - \sum_j (SEC_j \times \sum_i (SAC_{PJ,i,j} \times AP_{PJ,i,j,p}) \times EF_{elec,j})$

From 29/01/2016 to 31/12/2016

$$0.0864 \times 1.41 \times 1,640,409.00 / (1 - 25.2/100) \times 0.0005664 - 0.0864 \times 1.41 \times 1,640,409.00 \times 0.0005664 = 151.32 - 113.19 = 38.13 \text{ tCO}_2\text{e}$$

From 01/01/2017 to 31/12/2017

$$0.0864 \times 1.41 \times 8,876,817.07 / (1 - 25.2/100) \times 0.0005664 - 0.0864 \times 1.41 \times 8,876,817.07 \times 0.0005664 = 818.86 - 612.51 = 206.35 \text{ tCO}_2\text{e}$$

From 01/01/2018 to 31/10/2018

$$0.0864 \times 1.41 \times 11,192,337.38 / (1 - 25.2/100) \times 0.0005664 - 0.0864 \times 1.41 \times 11,192,337.38 \times 0.0005664 = 1,032.46 - 772.28 = 260.18 \text{ tCO}_2\text{e}$$

The project has been implemented in the phases and number of air jet looms operated is different among the years covered in the monitoring period.

Phase 1: 2 units installation completed on 29/01/2016

Phase 2: 57 units installation completed on 14/10/2016

Phase 3: 60 units installation completed in 15/12/2017.

Number of air jet loom units operated were:

2 units from 29/01/2016 to 13/10/2016

59 units from 14/10/2016 to 14/12/2017

119 units from 15/12/2017 to 31/10/2018.

Total amount of fabric woven by the project air jet looms during the period of 10 months (304 days) in year 2018 where all 119 units were operated is 11,192,337.38 m that is 13,438,168.24 m in a year ( $11,192,337.38 \times 365/304 = 13,438,168.24$ ) and is 79.96% of ex-ante estimate in the PDD (16,805,180.00 m in total).

The verification team assessed the reported data with documented evidence and by means of on site visit.

Through the processes taken, CAR 2 was raised as the resolution detailed below.

The details of the persons interviewed and the documents reviewed are shown in the Section F of this report.



Parameters	Monitored values	Method to check values in the monitoring report with sources
AP_PJ,i,j,p (2016)	1,640,409.00 m/p in total of 59 units	Assessment was conducted based on records of meter readings and on site assessment.
AP_PJ,i,j,p (2017)	8,876,817.07 m/p in total of 119 units	Assessment was conducted based on records of meter readings and on site assessment.
AP_PJ,i,j,p (2018)	11,192,337.38 m/p in total of 119 units	Assessment was conducted based on records of meter readings and on site assessment.
<p><b>&lt;Findings&gt;</b></p> <p><i>Please state if CARs, CLs, or FARs are raised, and how they are resolved.</i></p> <p>Grade / Ref: CAR 2</p> <p>Nature of the issue raised: Data of January 2016 for the first 2 units was not substantiated for production from 29 to 31/01/2016 (3 days) based on the records of daily production data. Data of December 2017 for the last 60 units were observed being missed from the reporting.</p> <p>Nature of responses provided by the PPs: The PPs omitted data in January 2016 and corrected data in December 2017 for the last 60 units. The revised MRS and supporting production data were submitted for review.</p> <p>Assessment of the responses: The verification team confirmed that the PPs have omitted the data monitored during 29 to 31/01/2016 and the monitored data of December 2017 was corrected for the last 60 units.</p> <p>The resultant ERs were changed:</p> <p>From 38.32 tCO<sub>2</sub> to 38.13 tCO<sub>2</sub> for 2016, and</p> <p>From 194.31 tCO<sub>2</sub> to 206.35 tCO<sub>2</sub> for 2017.</p> <p>The CAR was closed.</p> <p><b>&lt;Conclusion based on reporting requirements&gt;</b></p> <p><i>Please state conclusion based on reporting requirements.</i></p> <p>The verification team confirmed that appropriate methods and formulae for calculating REs and PE<sub>s</sub> have been followed. The verification team is of the opinion that all assumptions, emissions factors and default values that were applied in calculations have been justified.</p>		

#### C.5. Assessment of avoidance of double registration

**<Means of verification>**

The verification team assessed and confirmed relevance of the written confirmation from the PPs that the project is not registered under the other international climate mitigation mechanisms.

The team, in addition to the interviews with the PPs, checked publicly accessible information of Clean Development Mechanism (CDM), Joint Implementation (JI), Verified Carbon Standard (VCS) and Gold Standard (GS) and found no identical project as the proposed JCM project in terms of the name of entities, applied technology, scale and the location. The result of researches confirmed that the proposed project was not registered under the other international climate mitigation mechanisms than JCM and it will not result in a double counting of GHG emission reductions.

The details of the persons interviewed and the documents reviewed are shown in the Section F of this report.

**<Findings>**

*Please state if CARs, CLs, or FARs are raised, and how they are resolved.*

No issue was raised to the requirements of this section.

**<Conclusion based on reporting requirements>**

*Please state conclusion based on reporting requirements.*

The verification team confirmed that the project is not registered under other international climate mitigation programs.

**C.6. Post registration changes****<Means of verification>**

The verification team assessed the project documentation and through the on site visit and confirmed that there was no post registration change from the registered PDD or the approved methodology.

**<Findings>**

*Please state if CARs, CLs, or FARs are raised, and how they are resolved.*

No issue was raised to the requirements of this section.

**<Conclusion based on reporting requirements>**

*Please state conclusion based on reporting requirements.*

The verification through the verification processes determined that there was no post registration change from the registered PDD or approved methodology which prevent from use of the applied 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 FAR was issued in the validation and this is the first verification of the project.

**E. Verified amount of emission reductions achieved**

Year	Verified Emissions (tCO <sub>2</sub> e)	Reference Emissions (tCO <sub>2</sub> e)	Verified Project Emissions (tCO <sub>2</sub> e)	Verified Emission Reductions (tCO <sub>2</sub> e)
2013				
2014				
2015				
2016		151.32	113.19	38
2017		818.86	612.51	206
2018		1,032.46	772.28	260
2019				
2020				
2021				
2022				
2023				
2024				
2025				
2026				
2027				
2028				
2029				
2030				
Total (tCO <sub>2</sub> e)				504

**F. List of interviewees and documents received****F.1. List of interviewees**

Luckytex (Thailand) Public Company Limited

Yoshihiro Hamaguchi, Director, Deputy General Manager of Production Division, Deputy Mill Manager of Mill No. 1

Thaworn Rattanaphornpradit, Mill Manager of Mill No. 1

Jatuporn Seeta, General Manager of Weaving Department, Mill No. 1

Jeerawat Was-vaiwong, Deputy General Manager of Weaving Department, Mill No. 1

Wanna Prada, General Manager of Quality Assurance (QA) Department, Mill No. 1

Chantra Saeve, Staff of Quality Assurance (QA) Department, Mill No. 1

Toray Industries, Inc.

Satoshi Kojima, Senior Staff, Textiles Technical Planning Sect., Textiles Technical Dept., Shiga Plant

Mitsubishi UFJ Research and Consulting Co., Ltd.

Shinichiro Sano, Chief Consultant, Consulting Business Division, Optimum Solution Business Unit, Social Innovation Co-Creation Dept., Environment and Energy Business Consulting Group

## F.2. List of documents received

Category A documents (documents prepared by the PPs)

- Monitoring Report for years 2016, 2017 and 2018 submitted on 20/12/2018
- Revised Monitoring Report for years 2016, 2017 and 2018 completed on 30/01/2019 and 26/02/2019
- Production data in years 2016, 2017 and 2018
- Technical specification of project air jet looms model JAT810
- Technical specification of existing air jet looms model JAT710
- Installation confirmation certificates for air jet looms
- Layout plan
- Weaving loom replacement plan installation
- Specification of Toyota Factory Management System (FACT)
- Technical specification of measuring equipment
- Toyota Factory Management System (FACT) Instruction Manual
- Monitoring procedures
- Records of data checks
- Experimental data sheet
- Summary Grey Construction
- Written confirmation from the project participant on avoidance of double registration dated 06/12/2018
- Luckytex Mill No. 1 Machines Installation Data Sheet
- Monitoring Standards for JCM project
- Maintenance Standards for JCM project

Category B documents (other documents referenced)

- PDD Version 1.0 dated 05/01/2018 including the annexes
- Validation Report dated 08/03/2018
- Outline profile of Luckytex (Thailand) Public Company Limited
- JCM\_TH\_AM004\_ver01.0 Installation of energy saving air jet loom at textile factory, Version 01.0
- JCM Project Cycle Procedure JCM\_TH\_PCP\_ver02.0
- JCM Guidelines for Validation and Verification JCM\_TH\_GL\_VV\_ver01.0
- JCM Guidelines for Developing PDD and MR JCM\_TH\_GL\_PDD\_MR\_ver02.0
- JCM Glossary of Terms JCM\_TH\_Glossary\_ver01.0
- Approved Small Scale Methodology AMS II.C. Demand-side energy efficiency activities for specific technologies
- Proposed and registered projects under CDM, VCS, Gold Standard, and the other international schemes

**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.*

Certificate of Appointment is attached to this report.

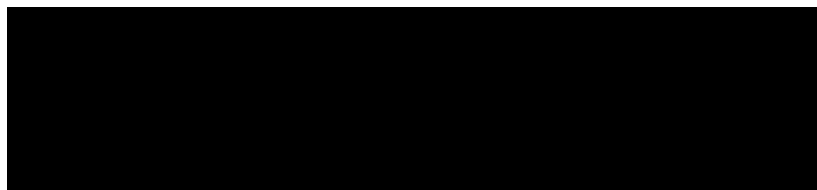
## Joint Crediting Mechanism Certificate of Appointment

Title of Project: Reducing GHG emission at Textile Factory of Luckytex (Thailand) Public Company Limited by Upgrading to Air-saving Loom (Ref# TH002)  
Verification for the first monitoring period: 29/01/2016 – 31/10/2018

We hereby certify that the following personnel have engaged in the verification process that has fully satisfied the competence requirements of the verification of the JCM project.

Name of Person	Assigned Roles
Michiaki Chiba	Team Leader
Ketan S. Deshmukh	Team Member
Kannika Thiemtad	Host Country Expert
Stewart Niu	Technical Reviewer

Signed by



Michiaki Chiba  
Climate Change Manager – Asia & Pacific  
27/12/2018