Verification Report for

Project : KIL Waste Heat to Power Project, India.

UCR Project ID : 380

Name of Verifier	SQAC Certification Pvt. Ltd.
Date of Issue	January 17, 2024
Project Proponent	M/s Kamachi Industries Ltd (KIL)
UCR Project Aggregator	Global Green Energy LLC
Work carried by	Mr. Santosh Nair
Work reviewed by	Mr. Praful Shinganapurkar

Summary:

SQAC Certification Pvt. Ltd. has performed verification of the "KIL Waste Heat to Power Project, India". The project activity is the utilisation of waste heat of flue gases generated in DRI kilns of sponge iron plant of Kamachi Industries Ltd (KIL) in power generation. The power produced is used actively at the sponge iron plant of KIL and the surplus power generated by the Waste Heat Recovery Boilers (WHRB) plant is consumed by the adjoining steel plant owned by KIL which is within the same premises as the WHRB plant. The project activity results in reduced carbon emissions by displacing equivalent amount of power generation in Southern Region grid connected power stations in India.

The project activity meets the following UN SDG's:

Verification for the period: **01/01//2018 - 31/12/2022** (5 years 0 months)

The GHG emission reductions were calculated on the basis of UCR Protocols which draws reference from, UCR Protocol Standard Baseline, CDM UNFCCC Methodology, ACM0012 Waste energy recovery Version 6.0. The verification was done was done remotely by way of video calls / verification, phone calls and submission of documents for verification through emails.

SQAC is able to certify that the emission reductions from KIL Waste Heat to Power project, India, (UCR ID – 380) for the period **01/01/2018 to 31/12/2022** amounts to **2,14,630 CoUs** (**2,14,630** tCO_2eq)

<u>Detailed Verification Report</u>:

Purpose:

The project activity entails utilisation of waste heat of flue gases generated in DRI kilns of sponge iron plant of Kamachi Industries Ltd (KIL, formerly Kamachi Sponge & Power Corporation Limited, Project Proponent or PP hereafter) in power generation. The power produced is used actively at the sponge iron plant of KIL. Apart from the utilization of the power at the sponge iron plant, the surplus power generated by the Waste Heat Recovery Boilers (WHRB) plant is consumed by the adjoining steel plant owned by KIL which is within the same premises as the WHRB plant. The project activity started commercial production from 29/12/2007 (contract date with AREVA, the technology supplier in the project activity).

Power from the WHRB plant, displaces equivalent amount of power from the Tamil Nadu Electricity Board (TNEB) grid, which is part of Southern Region (SR) grid in India. The project activity results in reduced carbon emissions by avoiding generation of this power in grid connected power stations.

KIL has set up 04 nos. DRI kilns of 100 TPD each at its sponge iron production unit. Annual sponge iron production is ~120000 TPA. Each of the kilns generates ~25000 Nm^3/hr of high temperature flue gases. The temperature of flue gases from the kiln leaving After Burner Chamber (ABC) is at ~950-1000 ^0C. This waste heat of flue gases is utilised in the generation of steam in (WHRB), which is further expanded in a single bleed-condensing turbine of 10MW to generate power. Steam from 04 nos. WHRB is taken to the turbine through a common header.

In the absence of the project activity, KIL would draw power from TNEB grid, which in turn generates power from fossil fuel power plants. The project activity thus displaces equivalent amount of power generation in SR grid connected power stations. The useful energy generated from the utilization of waste energy carried in the project activity is for generation of electricity.

The project activity is displacing an estimated total net electricity generation i.e., 238480 MWh from the Indian grid system, which otherwise would have been generated by the operation of fossil fuel based grid-connected power plant. The estimated annual average CO_2e emission reductions by the project activity is expected to be 214630 tCO_2e, whereas actual emission reduction achieved during the first CoU period shall be submitted as a part of the initial UCR monitoring and verification activity.




Location of project activity:

Plot No	: 86, 116-119 & 123-125
Village	: Pappankuppam
Taluk	: Gummudipundi
District	: Tiruvallur
State	: Tamil Nadu,
Country	: India
Longitude	: 79.57 E
Latitude	: 13.09 N

Scope:

The scope covers verification of emission reductions from the project - KIL Waste Heat to Power project, India, (UCR ID – 380).

Criteria:

Verification criteria is as per the requirements of UCR Standard.

Description of project:

The total installed capacity of the project activity is 10 MW and the auxiliary consumption as per the requirement of the auxiliary equipment at the WHRB plant is a maximum of 10% which is 1 MW. The balance of 7~8 MW of electricity generated by the WHRB plant is consumed by the adjoining steel plant owned by the PP which is within the same premises as the WHRB Plant.

KIL has installed 4X10 TPH Waste Heat Recovery Boilers (WHRBs) for utilising high temperature heat of flue gases from 4X100 TPD DRI kilns. DRI kilns, known as Direct Reduced Iron kilns by thermal systems, is a type of kiln used in the production of sponge iron wherein iron ore is reduced to iron in a reactor vessel, using reducing gases like hydrogen or carbon monoxide. The temperature of flue gases after 'After Burning Chamber' (ABC) is at 950-1000 ^{0}C.

Steam is generated at 67 kg/cm^2 and 485 ^{0}C and expanded in one single bleed-condensing turbine of 10MW to generate power. Each of the 04 kilns generates ~25000 Nm^3/hr of high temperature flue gases. The temperature of flue gases from the kiln leaving After Burner Chamber (ABC) is at ~950-1000 ^{0}C.

This waste heat of flue gases is utilised in generation of steam in (WHRB), which is further expanded in a single bleed-condensing turbine of 10MW to generate power. Steam from 04 nos. WHRB is taken to the turbine through a common header.

Waste heat recovery boiler

Capacity	10 TPH
Steam Pressure	67 kg/cm^2
Steam Temperature	485 +- 5 deg C
Nos.	04 Nos.
Flue gas inlet temp.	950 deg C
Flue gas inlet to ESP	175 deg C

Turbine

Rated Capacity	10 MW
Steam Inlet Pressure	64 ata
Steam Inlet Temperature	480 deg C
Nos.	1 nos.
Bleed pressure for deaerator	4 ATA

United Nations Sustainable Development Goals:

The project activity displaces Tamil Nadu Electricity Board (TNEB) power, part of SR grid, which is predominantly fossil fuel based. In the absence of the project activity equivalent amount of power generation would have taken place through fossil fuel dominated power generating stations.

Positive contribution of the project to the following Sustainable Development Goals:

Development Goals	Targeted SDG	Target Indicator (SDG Indicator)
 SDG 13: Climate Action	13.2: Integrate climate change measures into national policies, strategies and planning Target: **214630** tCO_2 for this monitored period	13.2.1: Number of countries that have communicated establishment or operationalization of an integrated policy/ strategy/ plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)
 SDG 7: Affordable and Clean Energy	By 2030, increase substantially the share of non fossil energy in the global energy mix Target: **238480 MWh** supplied per annum	The project activity helps reducing GHG emission in power generation in the grid, which is primarily fossil fuel based
 SDG 8: Decent Work and Economic Growth	8.5: By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value Target: Training, O&M staff	8.5.1: Average hourly earnings of female and male employees, by occupation, age and persons with disabilities

Level of Assurance:

The verification report is based on the on the information collected through interviews conducted over video calls / phone calls, supporting documents provided during the verification, Project Concept Note (PCN) / Monitoring Report (MR), submitted to SQAC. The verification opinion is assured provided the credibility of all the above.

Verification Methodology:

Review of the following documentation was done by SQAC Lead Verifier, Mr. Santosh Nair, who is experienced in such projects.

Documentation Verified:

- Project Concept Note (PCN)
- Monitoring Report (MR)
- Commissioning Certificate
- Calibration report
- Data provided upon request of all the documents of the related projects.

Sampling:

Not applicable

Persons interviewed:

1. Mr. Umashankar : M/s Kamachi Industries Ltd (KIL).
2. Mr. Umanath : M/s Kamachi Industries Ltd (KIL).

Documentation Verified:

- Project Concept Note (PCN)
- Monitoring Report (MR)
- Calibration Reports
- Commissioning Certificate
- Energy Meter Log Sheets

To Whom it May concern

Certified that M/s. Kamatchi Sponge and Power Corporation Ltd.,

Gummidipoondi had Synchronized their 10 MW Power Plant with Tamil

Nadu Electricity Board Grid at 33 KV level on 31.12.2007.

3/3/08.

S.MURALIDHARAN B.E.,
ASST. EXECUTIVE ENGINEER
O & M / CEDC / N/ TNEB
PANJETTY - 601 204

Date : 03.03.2008

Place: Durainallur.

To. Praveen. Sir

GOVERNMENT OF TAMILNADU
ELECTRICAL INSPECTORATE

From
The Chief Electrical Inspector
to Government,
Thiru.Vi.Ka Industrial Estate,
Guindy, Chennai-600 032

To
Thiru.Kamachi Sponge and Power
Corporation Ltd.
Papankuppam Village-602 201
Gummidipoondi, Kancheepuram District

Letter No.KPM.767/CEIG/03/2007-1 Dated 2.11.2007

Sirs,

Sub: Indian Electricity Act 2003 and Indian Electricity Rules 1956 – New Co-generation Plant - HV/MV & LV Electrical Installation at Thiru.Kamachi Sponge and Power Corporation Ltd., Papankuppam Village-602 201 Gummidipoondi, Kancheepuram District - Inspection under Rule 63 of Indian Electricity Rules, 1956 on 23.10.2007- Approval – accorded.

Ref: 1) This office Letter No.KPM.767/CEIG/03/2007 Dated 12.10.20076
2) Your letter No.Nil dated 15.10.2007
3) This office letter No.KPM.767/CEIG/R63/D3/2007 Dated 24.10.2007
4) Your letter No.AP/L/067/07-08 dated 3.10.2007

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Under Rule 63 of Indian Electricity Rules, 1956, Approval is hereby accorded to commission the Electrical Installations inspected on 23.10.2007 at the above premises as detailed in Annexure subject to complying with the terms and conditions of the supplier.

Separate approval for 33 KV Switch yard with Power Transformer should be be obtained after producing TNEB approval for parallel operation.

The date of energisation of the installation may be intimated to this office.

Under Rule 30(4) and 46 (3) of Indian Electricity Rules 1956, the consumer is at all times solely responsible for the maintenance of the above installation in such a condition as to be free from danger.

(Sd/xx)
CHIEF ELECTRICAL INSPECTOR TO GOVERNMENT

Encl: Annexure containing List of Electrical Equipment

//True Copy//Forwarded//

ASSISTANT ELECTRICAL INSPECTOR (TECHNICAL

Copy to: Thiru.Alfa Power Engineers Pvt.Ltd., Chennai-15 (With Annexure)

Copy to: The Superintending Engineer/Tamil Nadu Electricity Board
Chennai Electricity Distribution Circle/North/Chennai (With Annexure)

Copy to: The Electrical Inspector/Kancheepuram (With Annexure)
Copy to: The Assistant Electrical Inspector/Ponneri (With Annexure)
The Balance Inspection fees of Rs.3740/- has been adjusted in Bill No.315/2007-08 dated 12.10.207
rs.2.11

GOVERNMENT OF TAMILNADU Form D
GOVERNMENT ELECTRICAL STANDARDS LABORATORY
Office of the Chief Electrical Inspector to Government
Thiru.Vi.Ka Industrial Estate
Guindy, Chennai-32

CALIBRATION CERTIFICATE

Certificate No:2712/GESL/2018 Page 1 to 4
Date of Calibration: 13.07.2018

1 Personal Register (P/R) No. : 989/2018

2 Name & Address of the Customer : M/s. Kamachi Industries Limited, Partha Palayam Village, S.R,Kandigai Post, Gummidipoondi- 601 201.

3 Description and Identification of device under calibration(DUC) : 3 Phase 4 wire Electronic Trivector meter, Make: Larsen & Toubro Limited Mysore, Model: ER 300 P, Sl.No.07022884, Voltage:- 11KV/110V,Current: 100/1A, Freqency:50 Hz, Pulse: 5 imp/Unit, Class:0.2s for Active,Cl: 0.5 for ReActive. Mf: 1, Mfg: Jan-2007

4 DUC Received on : 10.07.2018

5 Condition on receipt : Functional

6 Calibration Procedure Referance : VII of 003/CEIG/GESL/CPM

7 Environment conditions : Temperature: 23°C ± 2.5 °C RH: <70%

8 Traceability details :

SL.No	Standards used	Calibrated at/ Certificate Ref No.	Valid upto
1	3P Precision Measuring Instrument, Make: ZERA, Model : EPZ303-08, Sl.No: 050027197	Yadhav Measurements Pvt Ltd. Udaipur, Rajasthan, India - 313 003. REF:YMPL/307728/98913	03.06.2019.

All Measurement are traceable to the National/International Standards

25-7-2018
Calibrated By
(Tester I/II/III)

25/7/18
Checked By
Foreman I/II/III

Issued by
Junior Electrical Inspector/
Assistant Electrical Inspector
(Authorized Signatory)

Phone : 044-2250 0184, 2250 0796, EXtn Nos, 114,115 Fax : 044-2250 0036Web site : www.tnei.tn.gov.in Email: eitech@tn.gov.in, ceig@tn.gov.in

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GOVERNMENT OF TAMILNADU Form D
GOVERNMENT ELECTRICAL STANDARDS LABORATORY
Office of the Chief Electrical Inspector to Government
Thiru.Vi.Ka Industrial Estate
Guindy, Chennai-32

CALIBRATION CERTIFICATE

Certificate No: 1618/GESL/2021 Page 1 to 4
Date of Calibration: .14.06.2021 & 15.06.2021.

1 Personal Register (P/R) No. : 560/2021

2 Name & Address of the Customer : M/s. Kamachi Industries Limited, Survey No:86, 115-119, 123, Partha Palayam Village, S.R,Kandigai Post, Gummidipoondi- 601 201.

3 Description and Identification of device under calibration(DUC) : 3 Phase 4Wire Electronic Trivector meter, Make: Larsen & Toubro Limited Mysore, Model: ER 300 P, Sl.No.07022891, Mf:1, Voltage:3*63.5V, PTR:-11KV/110V, Current: 800/1A, Freq:50 Hz, Pulse Rate: 0.625 imp/Unit Class:0.2s for Active ,0.5s for Reactive, Mfg: 2007.

4 DUC Received on : 11.06.2021

5 Condition on receipt : Functional

6 Calibration Procedure Referance : VII of 003/CEIG/GESL/CPM

7 Environment conditions : Temperature: 23°C ± 2.5 °C RH: <70%

8 Traceability details :

SL. No	Standards used	Calibrated at/ Certificate Ref No.	Valid upto
1	3P Precision Measuring Instrument, Make: ZERA, Model : EPZ303-08, Sl.No: 050027197	Zera India Pvt Ltd. Gandhi Nagar, Gujarat. REF: ZIPL/2021/ECL/001.	06.01.2023.

All Measurement are traceable to the National/International Standards

22.6.2021
Calibrated By
(Tester I/II/III)

22/06/2021
Checked By
Foreman I/II/III

Issued by 25/6/2021
~~Junior Electrical Inspector/~~
Assistant Electrical Inspector
(Authorized Signatory)

Phone : 044-2250 0184, 2250 0796, EXtn Nos, 114,115 Fax : 044-2250 0036Web site : www.tnei.tn.gov.in
Email: eitech@tn.gov.in, ceig@tn.gov.in

GOVERNMENT OF TAMILNADU Form D
GOVERNMENT ELECTRICAL STANDARDS LABORATORY
Office of the Chief Electrical Inspector to Government
Thiru.Vi.Ka Industrial Estate
Guindy, Chennai-32

CALIBRATION CERTIFICATE

Certificate No: 1749/GESL/2022 Page 1 to 4
Date of Calibration: .31.05.2022 & 01.06.2022.

1 Personal Register (P/R) No. : 637/2022
2 Name & Address of the Customer : M/s. Kamachi Industries Limited, NCP Division Parthapalayam Village, S.R,Kandigai Post, Gummidipoondi- 601 201.
3 Description and Identification of device under calibration(DUC) : 3 Phase 4Wire Electronic Trivector meter, Make: Larsen & Toubro Limited Mysore, Model: ER 300 P, Sl.No.09142129, Mf:1, Voltage:3*63.5V, PTR:-11KV/110V, Current: 800/1A, Freq:50 Hz, Pulse Rate:0.62500 imp/kWh, 0.62500 imp/kvarh, Class:0.2s for Active ,0.5s for Reactive, Mfg: 2009.
4 DUC Received on : 30.05.2022
5 Condition on receipt : Functional
6 Calibration Procedure Reference : VII of 003/CEIG/GESL/CPM
7 Environment conditions : Temperature: 23°C ± 2.5 °C RH: <70%
8 Traceability details :

SL.N	Standards used	Calibrated at/ Certificate Ref No.	Valid upto
1	Three Phase Reference Standard, Make: ZERA, Model : COM 3003, Sl.No: 050069528	Zera India Private Limited Gandhinagar, Gujarat - 382 024. Certificate No:ZIPL/2022/ECL/159.	11.03.2024.

All Measurement are traceable to the National/International Standards

6.6.2022
Calibrated By (Tester I/II/III)
Checked By Foreman I/II/III
Issued by Authorized Signatory

GOVERNMENT ELECTRICAL STANDARDS LABORATORY GUINDY CHENNAI-32

Phone : 044-2250 0184, 2250 0796, EXtn Nos, 114,115 Fax : 044-2250 0036Web site : www.tnei.tn.gov.in
Email: eitech@tn.gov.in, ceig@tn.gov.in

Scanned with CamScanner

KAMACHI INDUSTRIES LIMITED
10 MW NCP DIVISION - GUMMIDIPOONDI - 601201.
DAILY ENERGY METER LOG SHEET

KIL-SID-MNT-EL-F-09-B2

01/12/2021 — NOTE : L&T MTR IN KWH CONVERT TO KWH X 1000 = MWH READING NOTED

	TUR. GEN	AUXILLARY	SPONGE		52B TIE BREAKER								Import from 70 MW Via 6.6 KV		REMAKES
					EXPORT				IMPORT						
TIME	MWH	MWH	MWH	MWH	MWH	MVARH	MVARH	MVAH	MWH	MVARH	MVARH	MVAH	MWH	MVAH	
12.00 MN	80.43	72.93	58.84	01.88	95.71	33.50	42.27	57.54	36.09	70.19	30.71	60.92	34.93	46.31	
01.00 AM		72.96							36.12	70.22	30.71	60.96			
02.00 AM		72.98							36.14	70.25	30.71	60.99			
03.00 AM		73.00							36.16	70.28	30.71	61.02			
04.00 AM		73.02							36.19	70.30	30.71	61.06			
05.00 AM		73.05							36.21	70.32	30.71	61.09			
06.00 AM		73.07							36.23	70.34	30.71	61.12			
07.00 AM		73.10							36.26	70.38	30.71	61.17			
08.00 AM		73.13							36.29	70.38	30.71	61.21			
09.00 AM		73.17							36.33	70.40	30.71	61.25			
10.00 AM		73.25							36.40	70.44	30.71	61.34			
11.00 AM		73.32							36.47	70.49	30.71	61.45			
12.00 MN		73.39							36.55	70.57	30.71	61.57			
01.00 PM		73.42							36.59	70.60	30.71	61.62			
02.00 PM		73.46	58.84	01.88					36.62	70.62	30.71	61.67			
03.00 PM		73.49	58.84	01.91					36.67	70.67	30.71	61.74			
04.00 PM		73.50	58.89	01.94					36.71	70.72	30.71	61.84			
05.00 PM		73.53	58.91	01.98					36.76	70.77	30.71	61.93			
06.00 PM		73.56							36.79	70.79	30.71	61.95			
07.00 PM		73.59							36.82	70.83	30.71	61.20			
08.00 PM		73.62							36.85	70.86	30.71	61.24			
09.00 PM		73.65							36.88	70.89	30.71	61.28			
10.00 PM		73.68							36.91	70.92	30.71	61.33			
11.00 PM		73.72							36.95	70.96	30.71	61.38			
12.00 MN		73.75							36.98	70.99	30.71	61.42			
TOTAL		0.82	0.07						0.89						
NO. REV. IN TRV. MTR													TUP TRIP TIME		
NOTE : ONCE THE TRIVECTOR METER WILL COME 100MWH IT WILL RESET THENT IT WILL START FROM "0" MWH			A SHIFT SIGN		S.I.		Elect/ACO		Sr. P/K				TG & GRID SYN TIME		
			B SHIFT SIGN										TUR. FAILURE HRS.		
			C SHIFT SIGN												

KAMACHI INDUSTRIES LIMITED
10 MW NCP DIVISION - GUMMIDIPOONDI - 601201.
DAILY ENERGY METER LOG SHEET

KIL-SID-MNT-EL-F-09-B2

30/06/2022 — NOTE : L&T MTR IN KWH CONVERT TO KWH X 1000 = MWH READING NOTED

	TUR. GEN	AUXILLARY	SPONGE		52B TIE BREAKER								Import from 70 MW Via 6.6 KV		REMAKES
					EXPORT				IMPORT						
TIME	MWH	MWH	MWH	MWH	MWH	MVARH	MVARH	MVAH	MWH	MVARH	MVARH	MVAH	MWH	MVAH	
12.00 MN	72.05	17.01	73.46	59.19	91.85	70.62	45.44	65.24	56.40	58.29	30.72	10.12	38.03	50.12	
01.00 AM	85.19	17.63	74.60	58.50	98.23	71.85	45.44	21.35							
02.00 AM	93.40	18.27	75.76	58.82	06.64	73.08	45.44	77.23							
03.00 AM	01.47	18.87	76.88	61.14	10.99	74.31	45.44	88.80							
04.00 AM	09.65	19.50	78.03	62.46	17.39	75.54	45.44	91.32							
05.00 AM	17.29	20.14	79.17	63.74	23.75	76.80	45.44	97.83							
06.00 AM	26.00	20.80	80.33	64.87	30.14	78.04	45.44	03.44							
07.00 AM	34.34	21.40	81.35	66.16	36.66	79.56	45.44	10.98							
08.00 AM	42.64	21.98	82.42	67.45	43.56	80.79	45.44	17.88							
09.00 AM	50.64	22.60	83.61	68.68	49.84	81.94	45.44	24.40							
10.00 AM	58.67	23.24	84.65	70.00	56.05	83.07	45.44	30.86							
11.00 AM	66.60	23.87	85.81	71.40	62.25	84.40	45.44	37.34							
12.00 MN	74.69	24.51	86.95	72.66	68.50	85.23	45.44	43.78							
01.00 PM	82.22	25.13	88.06	73.95	74.36	86.36	45.44	49.30							
02.00 PM	89.90	25.76	89.19	75.11	80.53	87.50	45.44	55.21							
03.00 PM	97.63	26.34	90.35	76.40	86.31	88.67	45.44	61.43							
04.00 PM	05.35	26.94	91.34	77.68	92.34	89.86	45.44	67.66							
05.00 PM	13.56	27.57	92.52	79.03	98.34	91.06	45.44	73.46							
06.00 PM	21.85	28.22	93.72	80.39	05.18	92.29	45.44	80.69							
07.00 PM	29.99	28.83	94.89	81.72	11.54	93.50	45.44	87.27							
08.00 PM	38.23	29.49	96.08	83.10	17.95	94.73	45.44	93.65							
09.00 PM	46.45	30.13	97.25	84.46	24.34	95.89	45.44	00.16							
10.00 PM	54.32	30.73	98.34	85.68	30.52	97.11	45.44	06.51							
11.00 PM	62.61	31.36	99.52	87.05	37.00	98.34	45.44	13.10							
12.00 MN	70.95	32.01	00.72	88.43	43.49	99.57	45.44	19.69							
TOTAL	193.90	15.00	27.26		151.64										
NO. REV. IN TRV. MTR	1/1				19								TUP TRIP TIME		
NOTE : ONCE THE TRIVECTOR METER WILL COME 100MWH IT WILL RESET THENT IT WILL START FROM "0" MWH			A SHIFT SIGN		S.I.		Elect/ACO		Sr. P/K				TG & GRID SYN TIME		
			B SHIFT SIGN										TUR. FAILURE HRS.		
			C SHIFT SIGN												

KAMACHI INDUSTRIES LIMITED
10 MW NCP DIVISION - GUMMIDIPOONDI - 601201.
DAILY ENERGY METER LOG SHEET

QMS/NCP/ELECT/DEMLS/024

01/06/2019 — NOTE : L&T MTR IN KWH CONVERT TO KWH X 1000 = MWH READING NOTED

	TUR. GEN	AUXILLARY	SPONGE		52B TIE BREAKER								Import from 70 MW Via 6.6 KV		REMAKES
					EXPORT				IMPORT						
TIME	MWH	MWH	MWH	MWH	MWH	MVARH	MVARH	MVAH	MWH	MVARH	MVARH	MVAH	MWH	MVAH	
12.00 MN	46.13	88.38	87.45	56.29	86.70	01.08	04.14	83.80	74.53	22.88	48.24	71.55	08.37	10.93	
01.00 AM	58.36	89.06	-	-	93.25	02.56	04.14	89.74							
02.00 AM	60.65	89.76	-	-	99.84	04.04	04.14	13.49							
03.00 AM	67.95	90.43	-	-	06.47	05.54	04.14	20.25							
04.00 AM	75.17	91.09	-	-	13.03	07.02	04.14	26.99							
05.00 AM	82.43	91.76	87.45	56.29	19.62	08.52	04.14	36.70							
06.00 AM	89.48	92.42	87.45	56.29	26.01	09.95	04.14	43.54							
07.00 AM	96.93	93.07	87.65	56.29	32.71	11.56	04.14	50.51							
08.00 AM	04.60	93.74	87.85	56.29	39.21	13.14	04.14	57.49							
09.00 AM	11.80	94.39	87.05	57.05	45.56	14.74	04.14	63.34							
10.00 AM	17.99	95.05	08.02	58.15	51.32	15.34	04.14	69.16							
11.00 AM	25.5	95.72	29.69	58.85	57.69	16.46	04.14	74.96							
12.00 MN	33.05	96.40	90.17	59.35	62.88	17.55	04.14	80.91							
01.00 PM	39.49	97.04	91.20	60.51	67.65	18.36	04.14	85.81							
02.00 PM	45.93	97.70	92.26	61.57	72.43	19.19	04.14	90.67							
03.00 PM	52.93	98.38	93.33	62.87	77.62	19.80	04.14	95.58							
04.00 PM	59.98	99.07	94.45	64.18	83.88	20.74	04.14	01.20							
05.00 PM	67.54	99.78	95.80	65.47	88.68	21.69	04.14	06.07							
06.00 PM	74.90	00.48	96.72	66.77	94.10	22.58	04.14	12.57							
07.00 PM	81.48	01.19	97.61	67.80	99.66	23.33	04.14	17.62							
08.00 PM	88.42	01.76	98.73	69.10	04.34	24.24	04.14	24.43							
09.00 PM	95.83	02.41	99.77	70.26	10.26	25.31	04.14	29.28							
10.00 PM	03.78	03.08	00.88	71.38	16.35	26.34	04.14	35.01							
11.00 PM	11.85	03.78	02.02	72.72	22.45	27.40	04.14	41.28							
12.00 MN	19.88	04.49	03.20	74.07	28.54	28.46	04.14	47.55							
TOTAL	173.70	16.11	15.75		141.84										
NO. REV. IN TRV. MTR	1	0			1								TUP TRIP TIME		
NOTE : ONCE THE TRIVECTOR METER WILL COME 100MWH IT WILL RESET THENT IT WILL START FROM "0" MWH			A SHIFT SIGN		S.I.		Elect/ACO		Sr. P/K				TG & GRID SYN TIME		
			B SHIFT SIGN										TUR. FAILURE HRS.		
			C SHIFT SIGN												

Applied methodologies and standardized baselines:

UCR Protocol Standard Baseline

SECTORAL SCOPE - 01 Energy industries (Renewable/Non-renewable Sources)

04 Manufacturing industries

TYPE III - Energy Efficiency

CATEGORY - **ACM0012** Large-scale Consolidated Methodology - Waste energy recovery Version 06.0

The consolidated methodology is applicable to project activities implemented in an existing or Greenfield waste energy generation (WEG) facility converting waste energy carried in identified waste energy carrying medium (WECM) stream(s) into useful energy (i.e. power, mechanical or thermal) consumed in an existing or Greenfield recipient facility(ies) and/or supplied to the grid in the case of electricity generation. The WEG facility may be one of the recipient facilities.

Applicability of methodologies and standardized baselines

- This project is included under this methodology since it applies to project activities that generate electricity from waste heat or the combustion of waste gases in industrial facilities. It's also included within the UCR Standard Positive List of technologies (updated) and is within the large -scale CDM thresholds under the applied methodology.

- Project activity involves power generation with installed capacity of 10 MW. Regulations do not require the project activity to recover and/or utilize the waste energy prior to the implementation of the project activity; The methodology is applicable where waste pressure is used to generate electricity only and the electricity generated from waste pressure is measurable.

- The proposed project activity is a power generation project from waste heat from DRI kilns in a sponge iron plant. The project activity displaces Tamil Nadu Electricity Board (TNEB) power, part of SR grid, which is predominantly fossil fuel based.

- The methodology allows for the recipient facility to be same as the waste energy generation facility. The project site is the waste energy generation facility and the facility itself receives useful energy generated using waste energy under the project activity.

Use of electricity from the waste heat utilisation in the project activity displaces an equivalent amount of electricity that would have been generated (in the absence of the project activity), by grid connected fossil fuel fired power plants. The project activity therefore results in reductions of emissions that would have taken place in the baseline scenario, viz., non-utilisation of the waste heat of the flue gases from the DRI kilns.

Applicability of double counting emission reductions

The project activity has been registered as a CDM project activity (registration date of the project activity under CDM mechanism is 03/10/2007) in the past.

The project activity was commissioned on 29/12/2007. It has undergone 05 CDM verifications for emission reductions achieved and has resulted in the issuance of CERs. The last CDM verification was for the seventh monitoring period 01/10/2016 to 30/12/2017 which is also the last in the CDM crediting period from 31/12/2007 to 30/12/2017 and has resulted in the issuance of CERs.

The project activity is seeking CoUs under the UCR CoU Standard/Program for the period 01/01/2018-31/12/2022 and hence there is no double counting issue of carbon credits for the said vintage period. Additionally, the same has been stated in the undertaking provided in the Double Counting Avoidance Assurance Document (DAA) by the PP.

The CDM project activity is as follows:

UNFCCC CDM Title	KSPCL Waste Heat to Power project, India	
CDM ID	1151	
Host Parties	M/s Kamachi Sponge & Power Corporation Limited (KSPCL)	
Sectoral Scopes	1 : Energy industries (renewable - / non-renewable sources)	
Methodology	ACM0004 ver. 2- Consolidated methodology for waste gas and/or heat for power generation	
Other Details	CDM Registration Date	03/10/2007
	Crediting Period	31/12/2007 – 30/12/2017 (Fixed)
Prior Issuance of CDM credits	Monitoring Period: 31/12/2007-31/03/2008 **CERs Issued: 3506**	
	Monitoring Period: 01/04/2008-31/03/2009 **CERs Issued: 16545**	
	Monitoring Period: 01/04/2009-31/03/2010 **CERs Issued: 22905**	
	Monitoring Period: 01/04/2010-31/08/2011 **CERs Issued: 31705**	
	Monitoring Period: 01/09/2011-31/12/2012 Awaiting CERs Issuance	

Agreement for Double Counting Avoidance from Proponent has been provided duly signed on 08/01/2024

Project boundary, sources and greenhouse gases (GHGs)

The spatial extent of the project boundary comprises the waste heat or gas sources, captive power generating equipment, any equipment used to provide auxiliary heat to the waste heat recovery process, and the power plants connected physically to the electricity grid that the proposed project activity will affect.

	Source	GHG	Included?	Justification/Explanation
Baseline	Grid-connected electricity	**CO_2**	**Included**	**Major source of emission**
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
Project Activity	On-site fossil fuel consumption due to project activity Combustion of waste gas for electricity generation	CO_2	Excluded	Project activity entails use of waste heat of the flue gases from DRI kilns for power generation. Project activity does not entail use of fossil fuels in the project activity. The emissions from onsite diesel consumption are negligible and are excluded for simplification. This is conservative.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.

Net GHG Emission Reductions and Removals

Thus, $ERy = BE_y – PE_y – LE_y$

Where:

ER_y = Emission reductions in year y (tCO_2/y)

BE_y = Baseline Emissions in year y ($t\ CO_2/y$)

PE_y = Project emissions in year y (tCO_2/y)

LE_y = Leakage emissions in year y (tCO_2/y)

Establishment and description of baseline scenario

Baseline emissions include only CO2 emissions from electricity generation in power plants that are displaced due to the project activity. The case established for the power required by the project activity, since it requires 1~2 MWh for its captive use, is less than the installed capacity of the equipment as per the methodology and its associated emissions quantification formula to be selected. The baseline emissions corresponding to electricity supplied by the project activity to recipient facilities is estimated for each recipient facility in accordance with the case established as above and in the case of the project activity is as follows:

(a) Case 1a: recipients whose project level electricity consumption is less than or up to the maximum capacity of the existing pre-project equipment at the recipient facility to use Equation (4)

$$BE_{EL,j,y} = \sum_i \left(EG_{i,j,y} \times EF_{Elec,i,j,y}\right) \qquad \text{Equation (4)}$$

Where:

$EG_{i,j,y}$	=	The power supplied by the project activity to the recipient facility *j*, which in the absence of the project activity would have been sourced from baseline source *i* (e.g. '*gr*' for the grid or '*is*' for an identified source) during the year *y* as per the identified baseline scenario for recipient facility *j* (MWh)
$EF_{Elec,i,j,y}$		The CO_2 emission factor for the baseline electricity source *i* (e.g. '*gr*' for the grid, and '*is*' for an identified source), corresponding to baseline scenario for the recipient facility *j*, during the year *y* (t CO_2/MWh)

(b) If the electricity displaced by the project activity in the recipient facility is supplied by a connected grid system, the CO2 emission factor of the electricity is modified from the UNFCCC CDM methodology and instead shall be determined following the guidance provided by the UCR CoU protocol for conservativeness.

Power Gen Cap Capacity	MW	10
Auxiliary Power Consumption	%	10%

Year	2018	2019	2020	2021	2022	Total
Total Generation (MWh)	54,192.62	50,446.56	28,171.78	35,158.33	35,416.36	2,03,385.65
Auxiliary Consumption (MWh)	5,266.22	4,829.78	3,125.10	3,349.77	3,608.06	20,178.93
Net Production (MWh)	48,436.57	47,110.49	47,921.32	47,969.46	47,042.55	2,38,480.39

Estimated Annual Baseline Emission Reductions: $BE_{EL, j,y} = EG_{BL,y} \times EF_{CO2, GRID, y}$

$BE_{EL, j,y}$ = Baseline emission reductions in a year y at project site/recipient plant (j).

where:
$EG_{BL,y}$ is calculated based on daily gross power generation and auxiliary power consumption in the power generation plant (recipient plant)

$EG_{BL,y} = EG_{GEN,y} – EG_{AUX,y}$.

where:
$EG_{BL,y}$ = Net power generation from turbine in year y (MWh/yr)
$EG_{GEN,y}$= Gross power generation from turbine in year y (MWh/yr)
$EG_{AUX,y}$= Auxiliary power consumption in power generation plant in year y (MWh/yr)

$EF_{Grid,CO2,y}$ = CO_2 emission factor of the grid in year y (t CO_2/MWh) as determined by the UCR Standard for the 2018-2022 period

A "grid emission factor" refers to a CO_2 emission factor (tCO_2/MWh) which will be associated with each unit of electricity provided by an electricity system. The UCR recommends an emission factor of 0.9 tCO_2/MWh for the 2018-2020 years as a fairly conservative estimate for Indian projects not previously verified under any GHG program. Also, for the vintage 2021-22, the combined margin emission factor calculated from CEA database in India results into same emission factors as that of the default value. Hence, the same emission factor has been considered to calculate the emission reduction.

No leakage is applicable under this methodology, hence, LE_y= 0

Issuance Period: 01/01/2018 to 31/12/2022

Year	2018	2019	2020	2021	2022	Total
Emission Reductions (tCO2)	43,592	42,399	43,129	43,172	42,338	2,14,630

Total Emission Reductions for the current crediting period =**2,14,630** tCO_2eq (**2,14,630** CoUs)

Conclusions:

Based on the audit conducted on the basis of UCR Protocol, which draws reference from UCR Protocol Standard Baseline, ACM0012 Waste energy recovery Version 6.0, the documents submitted during the verification including the Data, Project Concept Note (PCN) / Monitoring Report (MR), SQAC is able to certify that the emission reductions from the project - KIL Waste Heat to Power project, India (UCR ID – 380) for the period **01/01/2018 to 31/12/2022** amounts to **2,14,630 CoUs (2,14,630 tCO_2eq)**

Santosh Nair
Lead Verifier (Signature)

SQAC Certification Pvt. Ltd. Mapusa-Goa

Praful Shinganapurkar
Senior Internal Reviewer
(Signature)

Date: 17/01/2024