



Verification Report for

Project : Tumakuru Biodiesel Production from Waste Oil, Fat and Biomass.

UCR Project ID : 232

Name of Verifier	SQAC Certification Pvt. Ltd.
Date of Issue	November 06, 2023
Project Proponent	M/s Eco Green Fuels Pvt Ltd. (EGFPL), Tumakuru, Karnataka.
UCR Project Aggregator	Mr. Anish S.
Work carried by	Mr. Santosh Nair
Work reviewed by	Mr. Praful Shinganapurkar

Summary:

SQAC Certification Pvt. Ltd. has performed verification of the “Tumakuru Biodiesel Production from Waste Oil, Fat and Biomass, Karnataka, India”. The project activity specializes in manufacturing biodiesel using used cooking oil (UCO), waste animal fats and other biowastes (biomass) which are locally sourced to prepare biodiesel via a process called transesterification. The project activity is a biofuel production plant – which is the plant where feedstock (e.g., oil, waste oil/fat sugar, starch) is processed to biofuel.

Verification for the period: **01/01/2014 to 31/12/2022** (09 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, Large-scale Consolidated Methodology ACM 0017: Production of biofuel, Version 04.0. The verification 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 for Tumakuru Biodiesel Production from Waste Oil, Fat and Biomass, Karnataka, India, (UCR ID – 232) for the period **01/01/2014 to 31/12/2022** amounts to **12,121 CoUs (12,121 tCO₂eq)**

Accredited by 5 Jupiter House, Callera Park, Aldermaston, Reading Berkshire RG7 8NN, United Kingdom (UK).

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Detailed Verification Report:

Purpose:

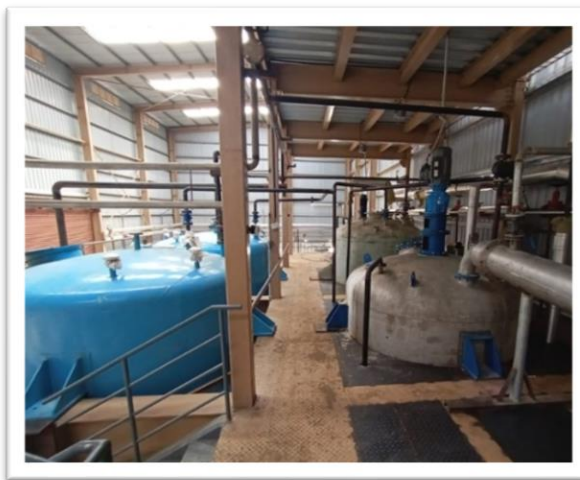
The biodiesel production process in Eco Green Fuels Pvt Ltd (EGFPL) consists of the homogeneously catalysed transesterification of UCO (used cooking oil) with methanol assisted by sodium or potassium hydroxide, as catalyst precursor. The alcohol used for esterification is methanol from fossil fuel origin. Volumes of biodiesel produced with alcohols other than methanol (for example, ethanol) are not included in the quantity of biodiesel for which emission reductions are claimed in this project activity.

The project activity was commissioned in 2011 and involves the construction and operation of a biofuel production plant for producing (blended) biofuel that is used as fuel in existing stationary installations (e.g., diesel generators) and in vehicles within India. The project activity is hence a renewable energy project activity that displaces more-GHG-intensive fossil fuel for combustion in vehicles and stationary installations. The UCO's chemical properties make it suitable for both renewable diesel and biodiesel production.

Processing Unit



Processing Unit





Distillation Unit



Reactor Unit



Methanol Storage



Factory Unit



Methanol Cooling Unit



Bleaching Unit





Location of project activity:

Country : India
Location : Survey No: 252, Road No. 1, 2nd Phase, Vasanthanarasapura Industrial Area,
District : Tumakuru
State : Karnataka
Pin Code : 572128
Latitude : 13° 30' 27.612" N
Longitude : 77° 1' 30.324" E



**Scope:**

The scope covers verification of emission reductions from the project - Tumakuru Biodiesel Production from Waste Oil, Fat and Biomass, Karnataka, India, (UCR ID – 232).

Criteria:

Verification criteria is as per the requirements of UCR Standard.

Description of project:

EGFPL has indigenously designed and developed this biodiesel facility to suit various requirements which are designed to handle low to high free fatty acids (FFA) feedstocks. EGFPL produces international standard biodiesel with an average density of 0.866 kg/l using their “Greenergiser- Biodiesel Processor” TM range of biodiesel processors which has the capacity to produce upwards of five tons per day (5 TPD) of biodiesel.

The biodiesel is manufactured from biogenic sources, which means that the oils and/or fats originate from either vegetable or animal biomass, but not from mineral (fossil) sources. The gross calorific value of the biodiesel produced is 9605 cal/g which is within the limits of the Indian



regulation (BIS range between 9400 - 9800 Cal/g). The by-product, glycerol, is sold to local cosmetic/brown soap industries in the surrounding area. EGFPL does not incinerate glycerol at the project activity site. The basic process is based on a process called transesterification in which low free fatty acids (FFA) containing triglycerides, are converted to fatty acid methyl ester. This process also converts UCO to UCO Methyl Ester usually called as UCOME which is a second-generation biofuel.

The second generation biodiesel includes non-edible vegetable oils, waste cooking oils as well as animal fats, which are considered as promising substitute for traditional edible food crops as they neither compete with food crops nor lead to land-clearing.

Biodiesel Specification	Value
Density @15 °C	875 kg/m ³ 0.875 kg/l
Flashpoint	138 °C
Sulphur Content	0.09%
Carbon Residue % by mass	0.019
Sulphated Ash % by mass	0.019
Water Content mg/kg	370
GCV cal/g	9605
NCV _{BD,y} Net calorific value of biodiesel produced in year y	42.652 GJ/t

Start Date of Crediting Period : 01/01/2014

Project Commissioned Date : 2011

This is the first monitoring report for the first crediting period for the period 01/01/2014 to 31/12/2022.

The total GHG emission reductions achieved in this monitoring period is as follows:

Summary of the Project Activity and ERs Generated for the Monitoring Period	
Start date of this Monitoring Period	01/01/2014
Carbon credits claimed up to	31/12/2022
Total ERs generated (tCO ₂ eq)	12121 tCO ₂ eq

**Level of Assurance:**

The verification report is based 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 above.

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)
- BARC Test report
- Sales Register
- Purchase Register

Sampling:

Not applicable

Persons interviewed:

1. Mr. Julesh Bantia – Founder & CEO : M/s Eco Green Fuels Pvt Ltd.

Applied methodologies and standardized baselines:

UCR Protocol Standard Baseline

SECTORAL SCOPE - 01 Energy industries (Renewable/Non-renewable Sources)
- 05 Chemical industries
- 07 Transport.

TYPE I - Renewable Energy Projects

CATEGORY - **ACM 0017: Large-scale Consolidated Methodology**

Production of biofuel, Version 04.0

This methodology comprises project activities involving production of biofuel that is



used as fuel in existing stationary installations (e.g., diesel generators) and/or in vehicles.

APPLICABILITY - The methodology is applicable to project activities that reduce emissions through the production of blended biofuels to be used in existing stationary installations and/or in vehicles. The biofuel is produced from one or a combination of the following feedstock:

- (a) Waste oil/fat.
- (b) Seeds or crops that are cultivated in dedicated plantations.
- (c) Biomass residues (e.g., agricultural residues, wood residues, organic wastes).

Applicability of methodologies and standardized baselines

- ❖ The biofuels and blended biofuels comply with national regulations and with suitable international standards.
- ❖ Biofuel is produced from waste oil/fat and biomass residues as feedstocks.
- ❖ The project activity involves the construction and operation of a biofuel production plant.
- ❖ The by-product (glycerol) is not disposed of or left to decay within the project boundary. It is used as a raw material for industrial consumption and sold. Methanol from fossil fuel origin is used for the esterification of vegetable oil and waste oil/fats.
- ❖ The (blended) biofuel is used by consumers within India in existing stationary installations (e.g., captive generators) and/or in vehicles. No modifications in the consumer stationary installations or in the vehicles engines are necessary to consume/combust the (blended) biofuel.
- ❖ The target consumer group (e.g., captive fleet of vehicles, gas stations, bulk consumers) and distribution system of the biofuel is identified and reported.
- ❖ For (blended) biofuels consumed in stationary facilities, the consumer and EGFPL are bound by a contract that allows EGFPL to monitor the consumption of (blended) biofuel and the consumer shall not claim UCR carbon offset units (CoUs) resulting from its consumption.



- ❖ In case of stationary installations, biofuels are blended in fractions of between 0 and 100%. In case of vehicles, the blending proportion is appropriate to ensure that the technical performance characteristics of the blended biofuels do not differ significantly from those of fossil fuels.
- ❖ Only methanol from fossil origin is included because the methodology does not provide procedures for estimating emissions associated with the use of other alcohols than methanol from fossil origin.
- ❖ Waste oil/fat - is defined as a residue or waste stream of biogenic origin from restaurants, agro and food industry, slaughterhouses or related commercial sectors.
- ❖ The biofuel is not produced from seeds or crops that are cultivated in dedicated plantations.
- ❖ Biofuels used at the project activity site of the biodiesel production plant for fuel combustion (e.g., for heat or electricity generation) is from the same biodiesel generated in the project activity production plant.
- ❖ No modifications in the consumer stationary installations or in the vehicles engines are necessary to consume/combust the (blended) biodiesel. In case of stationary installations, biodiesel or blended biodiesel with any blending fraction between 0 and 100% can be used. In case of vehicles, only blended biodiesel can be used, and the blending proportion must be low enough to ensure that the technical performance characteristics of the blended biodiesel do not differ significantly from those of Petro diesel. This condition is assumed to be met since the blending proportion is up to 20% by volume (B20).

Applicability of double counting emission reductions

The project activity has not applied for carbon credits under any other GHG programs.

Agreement for Double Counting Avoidance from Proponent has been provided duly signed on 20/03/2023.

Project boundary, sources and greenhouse gases (GHGs)

The spatial extent of the project boundary encompasses:

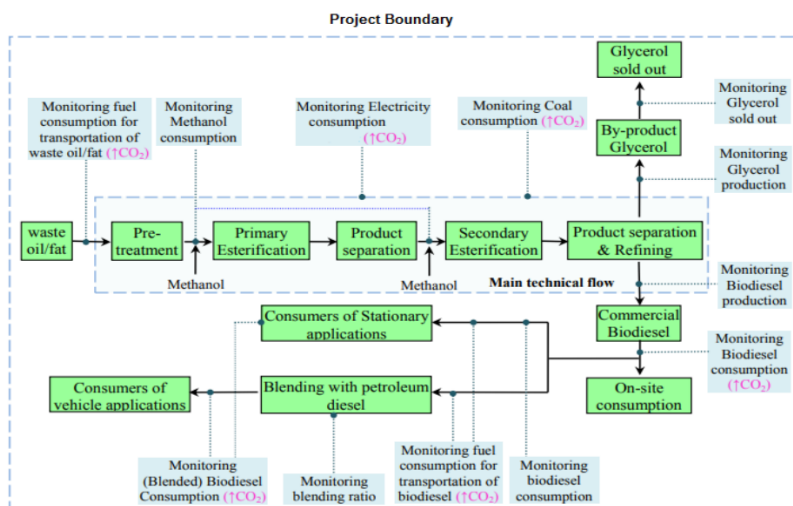
(a) where applicable, transportation of:

- Raw materials (e.g., seeds and/or biomass residues) to the project plant(s);
- Feedstock (e.g., vegetable oil and/or waste oil/fats) to the biofuel

production plant; and

- The biofuels to the site where it is blended with fossil fuels or used in stationary installations.

(b) the biofuel production plant at the project site, comprising the processing unit(s) (e.g., esterification, fermentation, hydrolysis) plus other installations on the site (e.g., storage, refining, blending, etc.).



	Source	GHG	Included?	Justification/Explanation
Baseline Emissions	Vehicles and stationery combustion installations consuming petrodiesel	CO ₂	Included	Major source of GHG emissions
		CH ₄	Excluded	Excluded for simplification. This is conservative.
		N ₂ O	Excluded	Excluded for simplification. This is conservative.
Project Activity	On-site energy consumption at biodiesel production plant	CO ₂	Included	Major source of GHG emissions from transesterification with methanol of fossil origin.
	Combustion of fossil fuel derived methanol in the biodiesel ester			
	Transportation of oil seeds, vegetable oils and or oil/fat wastes	CH ₄	Excluded	Excluded for simplification. This is conservative.
	Transportation of			



	biodiesel to blending facility			
		N ₂ O	Excluded	Excluded for simplification. This is conservative.

Leakage Emissions is not applicable as the project activity does not use technology or equipment transferred from another activity.

There is no registered or an application to register another similar carbon project activity with the same project participants in the same project category within 1 km of the project boundary, hence the project activity is not a debundled component of a large-scale project.

Establishment and description of baseline scenario

The baseline scenario identified of the project activity is:

- Continuation of petroleum diesel consumption.

Project Activity Emissions

Emission Reductions (ER_y) The emission reduction due to the project activity is calculated as the difference between the baseline emissions and the sum of the project emissions and the leakage:

$$ER_y = BE_y - (PE_y + LE_y)$$

BE_y = Baseline emissions in year y (t CO₂e)

$$BE_y = BD_y \times NCV_{BD,y} \times EF_{CO_2,PD,y}$$

$$BD_y = \left[\min \left\{ (P_{BD,y} - P_{BD,on-site,y}); \left(\sum_i f_{PJ,i,y} C_{BBD,i,y} \right) \right\} - P_{BD,other,y} \right] \cdot \left(\frac{\sum_i C_{BBD,i,y} \cdot \left(\frac{f_{PJ,i,y} - f_{reg,y}}{f_{PJ,i,y}} \right)}{\sum_i C_{BBD,i,y}} \right)$$



EF_{CO_2} = The CO_2 emission factor for petrodiesel in (tCO_2/TJ), obtained from reliable local or national data if available, otherwise, IPCC default emission factors are used.

BD_y = Quantity of biodiesel eligible for crediting in year y (t)

$P_{BD,y}$ = Quantity of biodiesel produced in the project plant in year y (t)

$P_{BD,on-site,y}$ = Quantity of biodiesel consumed at the project biodiesel production plant and/or the oil production plant(s) in year $y = 0$ (t)

$f_{PJ,B20,y}$ = Fraction of biodiesel in the blended biodiesel type in year y (100%)

$C_{BBD,B,y}$ = Quantity of blended biodiesel type consumed by the final consumer(s) (stationary installation in hotels/industries) in year y (t)

$f_{PJ,B,y}$ = Fraction of biodiesel in the blended biodiesel type in year y (100%)

$C_{BBD,B,y}$ = Quantity of blended biodiesel type consumed by the captive consumer(s) in year y (t)

$P_{BD,other,y}$ = Quantity of biodiesel that is either produced with alcohols other than methanol from fossil origin or produced using oil seeds or waste oil(s)/fat(s) other than those eligible under this methodology according to the applicability conditions in year $y = 0$ t

$EF_{CO_2,EL,y}$ = CO_2 emissions factor for electricity consumed in year y for biodiesel production = 0

The project activity consumes biodiesel at the biodiesel production plant, and the biodiesel is produced with methanol from fossil origin, so

$P_{BD,on-site,y} = 0$, and

$P_{BD,other,y} = 0$.

Project emissions on account of transportation of waste oil/UCO/methanol is negligible since they are sourced from industries within a 50 km radius of the project activity.

Project Emissions are only from CO_2 emissions from combustion of fossil carbon contained in methanol that is chemically bound in the biodiesel during the esterification process and released upon combustion.



$$PE_y = AF_{1,y} \times (PE_{BPF,y} + PE_{MeOH,y} + PE_{Tr,y} + AF_{2,y} \times PE_{BC,y})$$

Where,

$$PE_{BPF,y} = \sum_j PE_{FC,j,y} + PE_{EC,y} + PE_{W,y}$$

$$= FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y} + EC_y \times EF_{CO2,EL,y} \times (1 + TDL_y) + PE_{W,y}$$

$$PE_{MeOH,y} = MC_{MeOH,y} \times EF_{C,MeOH} \times \frac{44}{12}$$

$$PE_{tr,y} = \sum_m \sum_i (FC_{m,i,y} \times NCV_i \times EF_{CO2,i})$$

$$LE_y = LE_{MeOH,y} + LE_{WOF,y} - LE_{PD,y}$$

$$LE_{MeOH,y} = MC_{MeOH,y} \cdot EF_{MeOH,PC}$$

$$LE_{WOF,y} = 0$$

$$LE_{PD,y} = LE_{PROD,y} + LE_{REF,y} + LE_{LDT,y}$$

$$= BD_y \cdot \frac{NCV_{BD,y}}{NCV_{PD,y}} \cdot (EF_{PROD} + EF_{REF} + EF_{LDT})$$

$PE_{W,y}$ = Project emissions from anaerobic treatment of waste water in year $y = 0$

$AF_{2,y}$ = Allocation factor for the oil seeds cultivation in year $y = 0$

$PE_{BC,y}$ = Project emissions associated with the cultivation of land to produce oil seeds in year $y = 0$

Project emissions from fossil carbon in the biodiesel due to the use of methanol from fossil origin in the transesterification process ($PE_{MeOH,y}$)

These emissions are estimated as follows:

$$PE_{MeOH,y} = MC_{MeOH,y} \times EF_{CMeOH} \times 44/12$$

Where,

$PE_{MeOH,y}$ = Project emissions from fossil carbon in the biodiesel due to transesterification with methanol of fossil origin in year y (tCO₂)

$MC_{MeOH,y}$ = Quantity of methanol consumed in the biodiesel plant, including spills and evaporations on-site in year y (tMeOH)

$EF_{C,MeOH}$ = Carbon emissions factor of methanol, based on molecular weight (tC/tMeOH)



$44/12$ = Molecular weight ratio to convert t of carbon into t of CO_2 (tCO_2/tC)

There is a surplus of waste oil/fat in the region of the project activity and the project activity does not result in increased fossil fuel consumption elsewhere. Thus, the leakage emissions from displacement of existing utilization of waste oil/fat is zero, hence

$$L_{\text{EWO},y} = 0$$

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
% of Glycerol	26532	39888	41088.42	76314.7	84571.8	61154.7	10238.1	48295.3	15665.3
Methanol Consumed	32428	48752	50219.18	93273.5	103366	74744.7	12513.3	59027.5	19146.5
Methanol Tonnes (Bdy)	25.682	38.611	39.773	73.872	81.865	59.197	9.910	46.749	15.164

NCV_{PD}	=	42.652 GJ/t Net calorific value of petrodiesel as per 2006 IPCC Guidelines for GHG Inventories
EF_{CO_2}	=	0.0741 tCO_2/TJ IPCC 2006 guidelines for National Greenhouse Gas inventories got stationary combustion (petrodiesel)
EF_{MeOH}	=	0.375 $\text{tCO}_2/\text{tMeOH}$ is the default emissions factor for methanol based on molecular weight
MeOH conversion factor 1ltr)	=	0.791 KG
$f_{\text{PJ},\text{B100},y}$	=	Fraction of biodiesel in the blended biodiesel type B100 in year y 100% ratio



Issuance Period: 01/12/2014 to 31/12/2022

Year	Quantity of Biodiesel Sold (litres)	BE _y (tCO ₂ eq)	PE _{MeOH,y} (tCO ₂ eq)	Emission Reductions (tCO ₂)
2014	294800	815	18.1097908	796
2015	443200	1225	27.2261169	1197
2016	456538	1262	28.0454805	1233
2017	847941	2344	52.0896679	2291
2018	939687.2	2598	57.7257075	2540
2019	679497	1879	41.7420234	1837
2020	113757	314	6.98818002	307
2021	536614	1483	32.9646108	1450
2022	174059	481	10.6925783	470
			Total	12121

Total Emission Reductions for the current crediting period = **12,121 tCO₂eq (12,121 CoUs)**

Conclusions:

Based on the audit conducted on the basis of UCR Protocol, which draws reference from UCR Protocol Standard Baseline, CDM UNFCCC Methodology Large-scale Consolidated Methodology ACM 0017: Production of biofuel, Version 04.0, 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 - Tumakuru Biodiesel Production from Waste Oil, Fat and Biomass - (UCR ID – 232) for the period **01/12/2014 to 31/12/2022** amounts to **12,121 tCO₂eq (12,121 CoUs)**

Santosh Nair
Lead Verifier (Signature)



Praful Shinganapurkar
Senior Internal Reviewer
(Signature)

Date: 06/11/2023