UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

GOVERNMENT OF INDIA
MINISTRY OF NEW
AND RENEWABLE ENERGY

IREDA
Indian Renewable Energy
Development Agency Limited

Financial & Operational Guidelines

10 August 2021

Financial Support Scheme to Promote Innovative Industrial Organic Waste-to-Energy (IOWtE) Biomethanation Technologies and Business Models in India

GEF–MNRE–UNIDO PROJECT

The United Nations Industrial Development Organization (UNIDO) and the Ministry of New and Renewable Energy (MNRE), Government of India (GoI) are jointly implementing the Global Environment Facility (GEF) funded project – **Organic Waste Streams for Industrial Renewable Energy Applications in India**. The project is designed to support the demonstration of innovative industrial organic waste-to-energy biomethanation technologies and business models in India. It aims to trigger and assist industries, particularly Small and Medium Enterprises (SMEs) to adopt promising innovative technologies which manage waste in environmentally sound manner, increase biogas yields, provide downstream diversification and offer replication potential across waste and agro-industrial sectors.

The Large amounts of organic wastes have remained untapped for potential energy generation using biogas/bio-methane technology, particularly from four SME industrial sectors namely (i) Poultry (ii) Cattle farming (iii) Sugar (press mud) and (iv) Food, fruit and vegetable processing industry. Barriers such as seasonal availability of wastes, limited experience in co-digestion of multiple wastes as feedstock and lack of innovation in the biogas technology, applications of the biogas and byproducts, and related business models have so far curtailed the growth of waste-to-energy generation in these and related sectors.

The financial support scheme has been developed under the framework of this project to promote investment in and demonstrations of innovative biomethanation technologies and business models using wastes from above mentioned four sectors, and co-digestion along with other suitable organic wastes as additional feedstocks to reduce greenhouse gas (GHG) emissions.

Contents

Abbreviations

AD – Anaerobic Digestion (also biomethanation)

CFA – Central Financial Assistance (Capital Subsidy)

GEF – Global Environment Facility

GHG – Green House Gas

IREDA – Indian Renewable Energy Development Agency

IOWtE –Industrial Organic Waste-to-Energy

MNRE - Ministry of New and Renewable Energy

PMU – Project Management Unit

PAC – Project Approval Committee

EAG – Expert Appraisal Group

DIR – Detailed Innovation Report

1. Objective

The Ministry of New and Renewable Energy (MNRE) in partnership with United Nations Industrial Development Organization (UNIDO) and IREDA (Indian Renewable Energy Development Agency) under the GEF-UNIDO-MNRE project has established this financial support scheme to demonstrate and scale-up investments in innovative Industrial Organic Waste-to-Energy (IOWtE) biomethanation technologies and business models in India.

It aims to unlock investments in IOWtE projects that can build confidence of various stakeholders including industries, private investors, governments, banks and financial institutions that IOWtE is mature, feasible and promising for organic waste management and sustainable energy transformation in India

2. Call for Innovation

The project has prioritized four SME industrial sectors namely: (i) Poultry (ii) Cattle farming (iii) Sugar (press mud) and (iv) Food, fruit and vegetable processing industry. These are major source of organic waste with significant potential for energy generation using biogas/bio-methane technology. In spite of the large potential for waste-to-energy generation in these four sectors, major part of it remains untouched owing to the seasonal waste availability and lack of innovation in the biogas technology, applications of the biogas and byproducts, and related business models.

The industrial organic waste-to-energy bio-methanation projects are generally capital intensive and financially sensitive to both operating costs and revenue. The innovations in such projects to improve overall energy output lead to an increase in the overall project cost at its establishment yet reduce lifetime energy generation and its costs. The additional cost and lack of demonstrations of such biomethanation innovations may instill some lack of confidence among promoters, users, private investors and banks/financial institutions. Therefore, it is essential to offer financial support to select demonstrations of innovative waste-to-energy biomethanation projects to reduce perceived risks related to their feasibility.

This financial support scheme will support the demonstration of up to 6 innovative projects of installed capacities in range of 0.25 to 2 MW electrical output (roughly equivalent from 1.2 to 9.6 tons/day Bio-CNG/CBM/CBG) to showcase one or more sustainable innovations in the following areas.

1. Feedstock pre-processing and management.

   The modification of physical and/or chemical properties of organic waste to increase its shelf life (pre-biomethanation/digestion) and/or to optimize the efficiency of the overall biogas generation process and plant design will be considered as one of the areas of innovation.

   The chemical pre-treatment of organic waste may not be acceptable under feedstock pre-processing and management as the residual chemicals in the digestate may have detrimental impact on the quality of soil and ground water when used as fertilizer in agriculture.

   New models of waste collection, transportation and storage that facilitate optimized and sustainable supply of multiple wastes, including seasonal wastes, as feedstock to the biogas plant will be considered as part of innovation in feedstock management area.

2. Plant equipment and design.

   The latest developments in the design, construction and installation of anaerobic digesters or reactors enabling use of multiple wastes as feedstocks and improving resource efficiency such as recovery of waste heat and water will be included as part of innovation under plant equipment and design area.

3. Biogas scrubbing/ upgradation technologies.

   The improvement of existing biogas upgradation technologies such as Pressure Swing Adsorption (PSA), water scrubbing, amine scrubbing and emerging membrane filtration technology to minimize methane slip during upgradation or integrated design of multiple technologies to improve overall performance levels in biogas upgradation will be considered as innovation under this area of biogas scrubbing/upgrading technologies.

4. Biogas or Bio-CNG applications and innovative business models.

   The local supply of clean biogas (H_2S scrubbed) through biogas micro-grid or any such novel applications in supply-chain and distribution leading to improved utilization of clean biogas will be considered as innovative.

5. Value addition of digestate/manure.

   The developments in production of organic fertilizers using digestate will be considered as innovation under the area of value addition of digestate/manure.

6. New and advanced biochemical processes

   The Biochemical / Microbiological processes will primarily include the demonstration of microbial culture or inoculum to enhance the biogas production.

These demonstration projects need to have multiple feedstocks suitable for biogas generation and must have major part of it (at least 50% amount of the annual waste quantity) from at least one of the four priority SME industrial sectors.

3. Benefits of the Financial Support Scheme

- **Loan interest subvention**
  Subvention of interest rate by up to 5% from the current rate points will be offered from the date of commissioning of the biogas plant on the project loan tenure up to 8 years inclusive of 1 year of moratorium.
- **IREDA or other banker**
  The interest subvention is available for the project loans obtained from IREDA and also from public sector banks as well as the scheduled commercial banks from private sector listed by RBI.

4. Loan Interest Subvention Scheme

The financial support scheme aims to provide assistance to beneficiaries to reduce the financing burden of project loan interest rates faced in the demonstration and scale up of innovations in waste to energy biomethanation projects and business models.

Under this scheme, the financial assistance will be provided as subvention of interest on loans sanctioned to the demonstration projects exhibiting innovations in the areas as mentioned in section 2 - ‘Call for Innovation’ and will be applicable in the following manner.

S. No.	Energy Output	MNRE-GEF-UNIDO Interest Subvention	Applicable loan amount under the scheme
1	Biogas	4.0%	Up to ₹ 9.6 Cr per project
2	Power	4.5%	Up to ₹ 19.5 Cr per project
3	Bio-CNG/CBM	5%	Up to ₹ 39.2 Cr per project

5. Financial Incentive Disbursement Process

1. Call for Innovation • The Project Application and Detail Project Report (DPR) and Detailed Innovation Report (DIR) in specified format under Annexure-I are received by UNIDO PMU by email owte-india@unido.org on or before 1700 hours of 31st August 2021
2. Screening • Preliminary screening of project proposals by UNIDO PMU by 10th September 2021. Completed applications and DPR's are submitted to EAG.
3. Evaluation and Selection • Expert Advisory Group begins appraisal of the applications and may call applicants to make presentation on the impact of innovation on technical, financial, social, and environmental aspects before it. • EAG completes scoring-based evaluation by 30 September 2021. • The Letter of Recommendation (LoR) is issued to the shortlisted projects. It may be produced to IREDA or any other Financing Institutions (FI) for loan processing.
4. Application for Project Loan • The applicants apply for the project loans to IREDA or any other FI by complying to their respective documentation requirements and procedures. • List of necessary documents shall be available with IREDA or the FI.
5. Due-diligence • IREDA/FI conducts internal financial and technical due-diligence of loan applications and may seek assistance from UNIDO PMU. • The project loan sanction letter is issued to the approved projects and copy need to be submitted by the shortlisted applicants to UNIDO PMU before 30 November 2021.
6. Project Execution • IREDA/FIs completes the loan disbursement formalities as per their standard guidelines. The schedule of reporting the project installation and commissioning will be given to the project developers. • Beneficiary completes the project installation & commissioning and starts commercial operation on or before 30 September 2022.
7. Disbursal Incentive – Loan Interest Subvention • IREDA conducts final inspection of the project completion and beneficiary completes the third-party inspection of project performance (by SNA) and submits the Performance Assessment Report to UNIDO PMU to transfer the interest subvention amount to the project loan account. • The Performance Assessment Report format including Biogas/bio-CNG/power and Fertilizer generation for 2 months will be provided to the shortlisted applicants after the intimation of project commissioning to the UNIDO PMU

6. Project Selection

The Expert Appraisal Group (EAG) which is a panel of experts will conduct the final comprehensive scoring-based evaluation of the DPRs, Application and Detailed Innovation Report (please see the format in Annexure 1) to assess overall sustainability, scalability, replication potential and direct and indirect benefits of the project innovation to the society and environment.

The criteria for selection will be related to the assessment of technical, financial, social, and environmental aspects of the project including

A. Level of innovation
    a. Feedstock pre-processing and management
    b. Plant equipment and design
    c. Biogas scrubbing/ upgradation technologies
    d. Biogas or Bio-CNG applications and innovative business models
    e. Value addition of digestate/ manure
    f. New and advanced bio-chemical processes
    g. Any other innovation
B. Project financing/ Economics
C. Impact of innovations
    a. On energy demand
    b. On capital
    c. On operating expenses
    d. On revenue generation
D. Impact of project on environment (emission mitigation)
E. Employment generation

The final selection of the project will be done on the overall merit basis.

7. Eligibility

7.1. Project Eligibility norms

The prerequisites including size/capacity, feedstocks/wastes and innovations described under point 2. 'Call for Innovation' become the basic eligibility norms.

7.2. General Applicant Eligibility norms.

Eligible Entities/ Categories as per IREDA norms shall include the following. • Private Sector Companies/ firms • Central Public Sector Undertaking (CPSU) • State Utilities/ Discoms/ Transcos/ Gencos/ Corporations • Joint Sector Companies.

Applicants, registered in India, falling under any of the above categories, with borrowing powers and powers to take up new and renewable energy and energy efficiency projects as per their Charter, are only eligible to apply for financial assistance except for the following:

a) Trusts, Societies, Individuals, Proprietary concerns and Partnership firms (other than Limited Liability Partnerships, LLPs). However, they can be considered for financing only if they provide Bank Guarantee / Pledge of FDR issued by Scheduled Commercial Banks as described in RBI Act for the entire loan.

b) Loss making applicants and/ or, Applicants with accumulated losses (without taking in to account effect of revaluation of asset, if any) as per audited Annual Accounts of the immediate preceding financial year of operation. However, they can be considered for financing only if they provide security of Bank Guarantee/ Pledge of Fixed Deposit Receipt (FDR) issued by Scheduled Commercial Bank as described in RBI Act for the entire loan.

c) Applicants who are in default in payment of dues to Financial Institutions, Banks, NBFCs and/or IREDA.

d) Applicants/ Group Companies and/or Core promoters of the applicant company who,

- Default in payment of IREDA dues and/ or defaults of other banks/FI,

- Classified as willful defaulters as defined by RBI/ classified by other FIs and/ or,
- Had availed OTS from IREDA and/ or, from other Banks/FI,
- Convicted by court for criminal/ economic offences or under national security laws.

e) Greenfield Projects involving second-hand equipment and machinery.

8. Queries

All queries and requests for elucidation should to be sent via email to **owte-india@unido.org** **on or before 24 August 2021**.

9. SUBMISSION

Detailed Project Report (DPR) and the complete Application and Detailed Innovation Report (DIR) (Annexure – I) duly filled following the instructions given are required to be submitted in the pdf document format on **owte-india@unido.org** email address before 05:30 pm (IST) on 31 August 2021.

Annexure I – Application and Detailed Innovation Report (DIR)

1. Applicant Details

Name of the Applicant: ……..….

Date of establishment: ……

Complete postal address: ……...

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State: ……

PIN: ……

Telephone No. (1): +91 (STD code) ……...

Fax No.: +91 (STD code) ……...

Name of the contact person (1): ……...

Mobile No.: ……

Email ID: ……

Name of the contact person (2): ……...

Mobile No.: ……

Email ID: ……

GST number: ……

Registration/certification details: ……

2. Project Site Location

Project name: ……

Site address: ……

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Site Area: ……

Nearest town: ……

Distance from the town: ……

In case of leased land,

Details of the lessors ……

Duration of lease ……

3. Biogas Plant Specifications

3.1. Biogas generation (m^3/d): ……

3.2. Organic waste processing (tonnes/day): ……....

3.3. Plant Load Factor (PLF %): ……

3.4. Contracted organic waste feedstock availability:

Cattle dung (tonnes/year): ……

Poultry litter (tonnes/year): . ……

Pressmud (tonnes/year): ……

Food, fruit and vegetable

processing waste (tonnes/year): ……

Other types of organic waste (add lines, if required)

(1): …….. Qty (tonnes/year): ……..

(2): …….. Qty (m^3/year): …….

3.5. Electricity requirement (kW): ……..

Electrical energy requirement (kWh/year): ……..

3.6. Biogas applications

Thermal/cooking (m^3/y): ……..

Power generation (kW): ……

Electricity generation (kWh/year): ……

Bio-CNG/CBG/CBM generation (tonne/year): …….....

3.7. Organic manure generation

Solid manure (tonnes/year): ……

Liquid manure (m^3/year): ……

4. Plant Design and Operation

(Please provide general description including major equipment, type of Anaerobic Digestion (AD) process: dry/wet, digester types, feed preparation, digester heating, biogas collection and storage, power generating unit, biogas upgrading unit, Bio-CNG compression and storage, solid-liquid separation of digestate, manure preparation, specify standard followed (such as BIS or other international) etc., maximum 1000 words)

(Block Flow Diagrams (BFD)/ Process Flow Diagrams (PFD)

5. INNOVATION (60 Points)

(The following six broad areas of innovation from 5.1 to 5.6 are identified for the demonstration. Elaborate overall impact of innovation on the sustainability of the project and technical, financial, social, and environmental aspects social. Maximum word limit - 1000)

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5.1. Feedstock pre-processing and management

(Description in this section shall include information related to the modification of physical and/or chemical properties of organic waste to increase its shelf life and to optimize overall biogas generation process and plant design will be considered as one of the areas of innovation.
The chemical pre-treatment of organic waste shall not be taken into consideration under feedstock pre-processing and management as the chemicals used in the feedstock will remain in 'organic manure' after the anaerobic digestion, and may have detrimental impact on the quality of soil and ground water when used as fertilizer in agriculture.
New models of waste collection, transportation and storage facilitating optimized and sustainable supply of multiple wastes, including seasonal wastes as feedstock to the biogas plant will be

considered as part of innovation in feedstock management area. Maximum word limit - 500)

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5.2. Plant equipment and design.

(Description in this section shall include information related to the latest developments in the design, construction and installation of anaerobic digesters or reactors enabling use of multiple wastes as feedstocks and improving resource efficiency such as recovery of waste heat and water will be included as part of innovation under plant equipment and design area. Maximum word limit - 500)

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5.3. Biogas scrubbing/ upgradation technologies.

(Description in this section shall include information related to the improvements in the existing biogas upgradation technologies such as Pressure Swing Adsorption (PSA), water scrubbing, amine scrubbing and emerging membrane filtration technology to minimize methane slip during upgradation or integrated design of multiple technologies to improve overall performance levels will be considered as innovation under the area of biogas scrubbing/upgrading technologies. Maximum word limit - 500)

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5.4. Biogas or Bio-CNG applications and innovative business models.

(Description in this section shall include information related to the local supply of cleaned biogas (H_2S scrubbed) through biogas micro-grid will be considered as innovative business model. Maximum word limit - 500)

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5.5. Value addition of digestate/ manure.

(Description in this section shall include information related to the developments in production of organic fertilizers using digestate will be considered as innovation under the area of value addition of digestate/manure. Maximum word limit - 500)

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5.6. New and advanced biochemical processes

(Description in this section shall include information related to the Biochemical / Microbiological processes will primarily include the demonstration of microbial culture or inoculum to enhance the biogas production. Maximum word limit - 500)

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5.7. Any other innovations

(Description in this section shall include information related to any other innovation than mentioned above. Maximum word limit - 500)

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5.8. Details of the Patents, if any

(Provide details of the certificate or application)

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6. Project Financing **(15 Points)**

6.1. Total project cost (₹ Crore): ……...

6.2. Equity (₹ Crore): ……...

6.3. Loan (₹ Crore): ……...

6.4. Loan status: ……. (Sanctioned / Under processing / seeking banker)

Name of the Bank/ FI: ……... ……..

Rate of interest (%): ……...

Loan tenure (years): ..…… ……

6.5. Total Project cost (₹ Crore): ……...

6.5.1. Plant and machinery (₹ Crore): ……...

6.5.2. Land and building (₹ Crore): ……...

6.6. Revenue generation (₹ Crore/year): ……

6.7. Operating expense (₹ Crore/year): ……

6.8. Debt repayment (₹ Crore/year): ……

6.9. Simple payback (Years): ……

7. Impact of Innovation **(10 Points)**

(Wherever it is applicable and available.)

		UOM	**Pre-innovation**	**Post-innovation**
7.1.	On Captive consumption	(kWh)	----------	----------
7.2.	On Capital Cost	(₹ Crore)	----------	----------
7.3.	On Operating Expense	(₹ Crore/year)	----------	----------
7.4.	On Revenue Generation	(₹ Crore/year)	----------	----------
7.5.	GHG gas reduction	(tonnes of CO2/year)	----------	----------
7.6.	Effluents Generation	(MLD)	----------	----------

8. Explanation **(15 Points)**

(this section shall include references from international and national journals, reports, research papers, books and results of the in-house experimentation for the data provided under points 7. Maximum word limit - 3000)

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9. Documentation to be submitted at the time of application

(Submit the pdf copy of applicable documents from the following)

9.1. Land Document translated in English.

9.2. Raw Material Supply Agreement as applicable.

9.3. Biogas or Power or Bio-CNG (CBG) Purchase Agreement.

9.4. Agreement for sale of bio-fertilizers

9.5. Consent to Establish from Pollution Control Boards for Waste to Energy plant.

9.6. Approval for layout of the Bio-CNG Plant from Petroleum and Explosives Safety Organization (PESO), Nagpur

(for the documents not submitted kindly provide latest status below)

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