MINISTRY OF
DRINKING WATER AND SANITATION
Government of India

GOBAR-DHAN

Galvanizing Organic Bio-Agro Resources Dhan

Under Swachh Bharat Mission (GRAMIN)

स्वच्छ भारत
एक कदम स्वच्छता की ओर

Ministry of Drinking Water and Sanitation

Government of India
Antyodaya Bhawan, CGO Complex, New Delhi
http://swachhbharatmission.gov.in/

Acronyms

ANERT	Agency for Non-conventional Energy and Rural Technology
BDO	Block Development Officer
BDTC	Biogas Development and Training Center
BIS	Bureau of Indian Standards
CB	Capacity Building
CEO	Chief Executive Officer
CNG	Compressed Natural Gas
CREDA	Chhattisgarh Renewable Energy Development Agency
CSO	Civil Society Organization
CSR	Corporate Social Responsibility
DBT	Direct Benefit Transfer
DPR	Detailed Project Report
DWSC	District Water Sanitation Committee
EoI	Expression of Interest
FSTP	Faecal Sludge Treatment Plant
GEDA	Gujarat Energy Development Agency
GOBARDHAN	Galvanizing Organic Bio-Agro Resources Dhan
GP	Gram Panchayat
IEC	Information Education and Communication
IOT	Internet of Things
IREDA	Indian Renewable Energy Development Agency
KRC	Key Resource Committee
KREDL	Karnataka Renewable Energy Development Ltd.
KVIC	Khadi and Village Industries Commission
MDWS	Ministry of Drinking Water and Sanitation
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MIS	Monitoring Information System
MLALAD	Member of Legislative Assembly Local Area Development Division

MoA	Memorandum of Agreement
MPLAD	Members of Parliament Local Area Development Division
MPUVN	Madhya Pradesh Urja Vikas Nigam
MUDRA	Micro Units Development and Refinance Agency
NABARD	National Bank for Agriculture and Rural Development
NEDCAP	Non-conventional Energy Development Corporation of Andhra Pradesh
NGO	Non-Government Organization
NSDC	National Skill Development Corporation
NTAC	National Technical Advisory Committee
O&M	Operation and Maintenance
ODF	Open Defecation Free
OMC	Oil Marketing Companies
OREDA	Odisha Renewable Energy Development Agency
PEDA	Punjab Energy Development Agency
PSB	Public Sector Banks
PSU	Public Sector Undertaking
SBM (G)	Swachh Bharat Mission (Gramin)
SHG	Self-Help Group
SLWM	Solid and Liquid Waste Management
SNA	State Nodal Agency
STAC	State Technical Advisory Committee
TEDA	Tamilnadu Energy Development Agency
TIN	Tax Payer Identification Number
UPNEDA	Uttar Pradesh New & Renewable Energy Development Agency
UREDA	Uttarakhand Renewable Energy Development Agency
VAT	Value Added Tax
WBREDA	West Bengal Renewable Energy Development Agency
WHO	World Health Organization

Table of Contents

About the Guidelines

The Guidelines on GOBARDHAN provide details of the scheme, implementation arrangements, financing provisions and roles and responsibilities of the Centre, State Governments, Districts and of the stakeholders involved in its implementation. The Guidelines are to be read in conjunction with the guidelines of Swachh Bharat Mission (Gramin) issued by the Ministry of Drinking Water and Sanitation.

The Guidelines provide flexibility to State Governments to further improvise the implementation arrangements keeping the spirit of GOBAR-DHAN in mind, to support implementers plan and implement responsive initiatives. The Guidelines also provide templates for planning and monitoring of the scheme.

Ministry of Drinking Water and Sanitation may issue subsequent advisories and templates from time to time to further improve the implementation of the scheme.

GOBAR-DHAN

Galvanizing Organic
Bio-Agro Resources Dhan

1. Introduction

The Swachh Bharat Mission (Gramin) in rural areas aims to achieve open defecation free villages and improved cleanliness through Solid and Liquid Waste management, thus creating clean villages in India. With many States achieving ODF status, solid and liquid waste management takes prime importance in the endeavor.

Rural India generates enormous quantities of bio-waste including animal waste, kitchen leftovers, crop residue, market waste and fecal sludge. According to 19th Livestock Census of India, 2012, there are about 300 million bovines, 65.07 million sheep, 135.2 million goats and about 10.3 million pigs. Atleast 5,257 tonnes waste/ day is estimated to be generated from livestock alone. In addition, according to Indian Agricultural Research Institute's estimates in 2014, India generated 620 million tonnes of crop residue, of which 300 million tonnes are treated as waste and 100 million tonnes are burnt on farms.

Presently, a very large fraction of bio-waste gets disposed in unsafe ways – burning, unscientific dumping, discharging into water bodies, etc. on the other hand, bio-resources such as animal dung cakes, crop residue and firewood are commonly burned as cooking fuel leading to indoor air pollution. Indoor air pollution is also considered responsible for a significant number of acute respiratory illnesses in young children. WHO estimates about 5 lakh deaths in India due to unclean cooking fuel alone. Women and children suffer the most, as they spend large amounts of their time near indoor cooking hearth. Not only does unsafe management of waste leads to adverse environmental &health impacts but also destroys the resource value of this waste.

Fortunately, bio-waste has the potential to be harnessed as energy, fuel, and fertilizer. Waste such as cattle dung, poultry droppings, pig excreta, human excreta, crops & crop residues, kitchen waste etc., can produce biogas, through anaerobic digestion and produce clean fuel for cooking, lighting, electricity, running biogas based engines, etc. Some of the biomass waste also has potential to produce ethanol. The oil seeds like jatropha, karenge, rapeseeds, mahua seeds, neem seeds etc. can be converted to bio-diesel and other medicinal products. Woody biomass and powdery biomass waste like twigs, barks/ branches, arhar stalks, mustard stalks, coconut shells, saw dust, paddy husk, etc. can be converted to solid biomass fuels like pellets, briquettes and others.

2. About the Initiative

In an effort to ensure cleanliness in villages and generate wealth and energy by converting cattle dung and solid agricultural waste into compost and biogas and improve the lives of villagers,the launch of 'Galvanizing Organic Bio-Agro Resources Dhan' (GOBAR-DHAN) scheme was announced in Feb 2018. This initiative shall support biodegradable waste recovery and conversion of waste into resources. This shall support creating clean villages which is the objective of Swachh Bharat Mission (Gramin) and also provide economic and resource benefits to farmers and households. The GOBAR-DHAN scheme is expected to engage with people in safe and efficient managing of solid waste, especially the bio-agro waste in villages, so that the villages remain clean. GOBAR-DHAN scheme is a crucial component of the ODF Plus strategy of SBM(G) and will focus on supporting villages in management of bio-waste.

3. Objective of the Scheme

The intended impact of the scheme is cleaner villages through solid waste management, increased rural income, and reduced environmental impact. Accordingly, the scheme aims to have the following impact:

a. **Energy:** Villages become self-reliant in clean energy by harnessingbio-waste to generate bio-energy and thereby reduce burning and dependence on forests

b. **Empowerment:** Households consume cleaner and cheaper fuel through biogas/bio-CNG for cooking, saving on earnings and time; women of the household who typically engage in collection of firewood/ making dung cakes can be relieved of the drudgery involved

c. **Employment:** Local youth and semi-skilled technicians can benefit from skilling and potential green jobs such as collection of waste, transportation to treatment plants, management of plant, operation and maintenance of plants, sale and distribution of biogas and bio-slurry generated, etc.

d. **Organic Fertilizer:** The digested slurry from biogas plants, a rich source of manure, shall benefit farmers in supplementing chemical fertilizers

e. **Sanitation:** Improved sanitation, by reducing source of pollution, linking toilets to biogas, reducing waste from the villages

f. **Health:** Decrease in incidences of malaria and other sanitation related diseases through reducing waste stagnation in villages; and improving indoor air quality that is otherwise affected by burning of dung cakes and firewood

4. Scope of the Scheme

GOBAR-DHAN scheme proposes to cover 700 projects across the country in 2018-19. The scheme will be implemented in two phases i.e, 350 projects in first half of the year and rest in the second half. The States may choose to develop atleast one project per district or as many viable projects as possible to achieve effective bio-waste management in the villages.

The programme will be funded under SLWM component of SBM-G following the suggested guidelines of SBM(G). The total assistance under SBM (G) for SLWM projects is on the basis of total number of households in each GP, subject to a maximum of INR 7 lakh for a GP having up to 150 households, INR 12 lakh up to 300 households, INR 15 lakh up to 500 households and INR 20 lakh for GPs with more than 500 households. Funding for SLWM project under SBM (G) will continue to be provided by the Central and State Government in the ratio of 60:40 as per the existent formula.

Only those Gram Panchayats which have not availed SLWM funds under SBM(G) are eligible to receive the financial assistance under GOBAR-DHAN scheme, subject to the limits of guidelines. However, States shall have the flexibility to provide additional funds to any GP based on viability under the scheme through convergence with other Central/State schemes.

5. Recommended Models of Operation

Based on models largely successful in India, the following four models are recommended under the scheme and shall be eligible for incentive/ implementation. States are to use their discretion in selecting the right model/s or a combination of models that can be sustained in the many years to come.

Model A	Model B	Model C	Model B
Gram Panchayat	**SHG Federation**	**Bulk Waste Generator/ Entrepreneur**	**Any Eligible Enterprise**
Supported by Technical Agency ☑ Lease land/ GP land ☑ Collection of waste from project villages is mandatory ☑ Supplies to village at cost/ commercial sale/ buyback	Supported by Technical Agency ☑ Own/Lease/ GP land ☑ Collection of waste from project villages is mandatory ☑ Supplies to village at cost/ commercial sale/ buyback	Must engage technical agency if no experience ☑ Own land/ lease land ☑ Collection of waste from project villages is mandatory ☑ Self-consumption/ supplies to village at cost/ commercial sale/ buyback	☑ Own/lease land ☑ Waste from project villages or other ☑ Sells output to fuel companies
Incentive:	**Incentive:**	**Incentive:**	**Incentive:**
☑ 100% plant cost or as per SBMG SLWM slab as indicated below, whichever is less Plant serving GPs with total funds available: 150 HHs–3.5 lakh 300 HHs–6 lakh 500 HHs–7.5 lakh >500 HHs–10 lakh	☑ 75% plant cost or as per SBMG SLWM slab as indicated below, whichever is less Plant serving GPs with total funds available: 150 HHs–3.5 lakh 300 HHs–6 lakh 500 HHs–7.5 lakh >500 HHs–10 lakh	☑ 50% plant cost or as per SBMG SLWM slab, whichever is less Plant serving GPs with total funds available: 150 HHs–2.8 lakh 300 HHs–4.8 lakh 500 HHs–6 lakh >500 HHs–8 lakh	☑ No financial incentive ☑ States may facilitate purchase or buyback through PSUs ☑ GoI has no role

Incentive:	Incentive:	Incentive:	Incentive:
☑ 25% of incentive shall be in advance, at the time of DWSC approval ☑ Rest is paid one month after plant is operational ☑ 20% of total incentive released can be used to pay technical agency as turnkey fee	☑ 25% of incentive shall be in advance, at the time of approval by DWSC ☑ Rest is paid one month after plant is operational ☑ 20% of total incentive released can be used to pay technical agency as turnkey fee	☑ Incentive is back-ended ☑ 20% of total incentive released can be used to pay technical agency as turnkey fee	

Model A: Self Help Group (SHG) Federation, supported by technical agency is the Entity

Eligibility and Role of the SHG Federation

Self Help Groups (SHG) Federations, preferably of women may be the lead implementers of the project. SHG Federations, who are capable and willing to collect waste from the community and preferably with prior experience in running a biogas plant are eligible for the incentive. Experience in community mobilization/ community participation/ supporting Panchayat in implementing its programmes is must. Land for the project shall be either of own/ lease in nature or can be provided by the Gram Panchayat. SHG Federations should be registered entities with proven track record of performance and should be at least 1 year old. Mission Director in consultation with SLWM or any other competent State nodal agency working with SHGs should ideally certify that they are functional entities.

An NGO or a technical agency with experience in biogas must be engaged by the SHGs to support in setting up of the project and lend technical support. Waste segregation, aggregation, operation and maintenance and supply of biogas is the responsibility of the SHG, supported by its technical agency. Waste collection from

project villages is a must. Entity may choose to collect waste from villages outside of project village as well, when waste is low/seasonal, in order to keep the plant operational. At the time of preparation of the project proposal, it is the responsibility of the entity to assess the quantities and type of waste available, temperature of the region and propose the size of the plant and technology appropriate for generating biogas. The entity may choose to sell the biogas and bio-slurry outside the project area as well to commercial consumers, if the villagers are not willing to pay for a distribution grid and/or gas connections.

For collection of animal dung and or crop residue from farmers, the SHG can pay them an agreed price or arrange a barter system in return for bio-gas/slurry/any other agreed products. The entity may agree to pay households for inputs such as kitchen waste/animal dungas decided during Gram Sabha and provide slurry in exchange.

The entity can identify and engage local villagers for operations, collection of waste, maintenance of plant, etc. Such identified personal shall be trained by BDTC/certified by NSDC for supporting the project.

The project proposal shall address themanagement of biogasand bio-slurry generated. The entity has the flexibility to distribute the biogas output in any safe manner.

Incentive and Payment

In this model, incentive shall be 75% of the proposed project cost or according to SLWM slab under SBM(G) guidelines as indicated below, whichever is less:

S.No	No. of households in a GP	Maximum funding under SLWM	Maximum incentive under GOBAR-DHAN
1	150 households	7 lakh	3.5 lakh
2	300 households	12 lakh	6 lakh
3	500 households	15 lakh	7.5 lakh
4	>500 households	20 lakh	10 lakh

First instalment of 25% of the approved incentive shall be given as advance at the time of approval by DWSC. Remaining incentive shall be paid to the SHG one month after the plant is operational. State/district shall facilitate loans for SHGs, if required, through PSBs, MUDRA, etc.

20% of total incentive released can be used to pay technical agency as turnkey fee, where all inclusive cost such as for manpower, O & M, etc is to be paid. Rest, if applicable, can be arranged to be paid by the entity from other sources. An MoU between the parties is to reflect the same for a period of at least 3 years.

Model B: Gram Panchayat, supported by technical agency is Entity

Eligibility and role of Gram Panchayat

Gram Panchayat must be open defecation free and the same should be verified by the State. Gram Panchayats should have adequate bio-mass such as animal dung, farm residue, etc. in order to take up the project. This shall be monitored by DWSC before approval. Sarpanch shall be the nodal person responsible for successful implementation of the project. Gram Panchayat must take responsibility for waste collection from villages on a daily basis to supply to the biogas plant. GP should have institutional capacity for management of biogas, such as for manpower to engage for waste collection, account management, monitoring, etc. The GP must also have adequate sources of funds like user charges, property tax, water tax, 14th FC, etc. to be able to sustain the plant operations in the long term. Proof of funds must be submitted, at the time of application to State. The land for the project shall be of own or on lease in nature and shall be selected through a Gram Sabha resolution. The selected Gram Panchayat must show a good track record of implementing similar schemes such as SBM(G), water supply, etc. where successful community involvement, collection of user charges etc. have been demonstrated. DWSC shall be responsible in selecting such GPs.

A technical agency empaneled with the State shall be engaged by the GP, for installing the plant and providing O & M support for a period of atleast 5 years.

While considering the viability of the project, an assessment of waste available must be made including types of waste available across the year. The project proposal submitted by the GP shall compulsorily include a plan for managing biogas and bio-slurry without which the proposal shall not be considered. Bio-slurry from the biogas plant maybe used for farming or composting purposes. Villages with significant agricultural land where bio-slurry can be used, are ideal for this model. GP must understand implications of the technology chosen based on waste assessed.

Gram Panchayat must consider a community size plant mode where significant number of households and villages are benefitted from reduced waste in the

environment. The GP shall engage local manpower in the project, based on input received, andno permanent cadre of workers shall be created.

GP may choose to sell outputs like biogas and bio-slurry and the proceeds from the sale should be pumped back to the project. Separate accounts must be maintained to record all financial transactions.

Incentive and Payment

In this model, incentive shall be 100% of the proposed project cost or according to SLWM slab under SBM(G) guidelines as indicated below, whichever is less:

S.No	No. of households in a GP	Maximum funding under SLWM	Maximum incentive under GOBAR-DHAN
1	150 households	7 lakh	3.5 lakh
2	300 households	12 lakh	6 lakh
3	500 households	15 lakh	7.5 lakh
4	>500 households	20 lakh	10 lakh

First instalment of 25% on the approved incentive shall be given as advance at the time of approval by DWSC. Remaining incentive shall be paid to the Gram Panchayat one month after the plant is operational.

20% of total incentive released can be used to pay technical agency as turnkey fee, where allinclusive cost such as for manpower, O&M, etcis to be paid. Rest, if applicable,can be arranged to be paid by the entity from other sources. An MoU between the parties is to reflect the same for a period of atleast 3 years.

Model C: Bulk waste generator with/without support of technical agency is Entity

Eligibility and Role of the Bulk Waste Generator

Bulk waste generator can be a social enterprise/NGO/private enterprise/institution/ religious sites/factories/dairies/fisheries/markets/piggeries/slaughter houses/food complexes, etc. who generate bio-mass in large quantities at site. Collection of waste from project villages is mandatory. The entity may collect waste from other villages as well if not adequate. The project proposal shall include a plan to manage the biogas and bio-slurry produced which could includesupply to communities/ commercial entities at cost. For technical assistance, the entity shallpartner with a technical institute or NGO with relevant experience. If the entity

himself has the requisite technical expertise, the same shall be demonstrated to the STAC at the time of application. Land for the project shall be either of own or on lease in nature.

The entity shall take GP's support in garnering community support to part with waste. The entity may agree to pay for the inputs such as waste received from the community at a price as decided during Gram Sabha or agree to provide biogas/ bio-slurry in exchange. For collection of animal waste/ crop residue from farmers, the entity can pay them an agreed price or arrange a barter system in return for bio-gas/slurry/any other agreed products. Entity may choose to collect waste from villages outside of project village, when waste is low/seasonal, in order to keep the plant operational.

The distribution mechanism is upto the entity as long as it is collecting waste from the project villages. Where distribution to households is a challenge, a common facility such as community kitchen can be propagated, where biogas is supplied and the community can access the facility.

At the time of preparation of the project proposal, it is the responsibility of the entity to assess the quantities and type of waste available, temperature of the region and select the size of the plant and technology appropriate for generating biogas. Ideally, all households from who the waste is collected maybe provided with biogas.

Incentive and Payment

In this model, incentive shall be 50% of the proposed project cost or according to SLWM slab under SBM(G) guidelines as indicated below, whichever is less:

S.No	No. of households in a GP	Maximum funding under SLWM	Maximum incentive under GOBAR-DHAN
1	150 households	7 lakh	2.8 lakh
2	300 households	12 lakh	4.8 lakh
3	500 households	15 lakh	6 lakh
4	>500 households	20 lakh	8 lakh

In this model, incentive shall be back-ended, with 50% of the approved incentive at the time of start of operation and the remaining, at the end of one year of continued operation.

20% of total incentive released can be used to pay technical agency as turnkey fee, where all inclusive cost such as for manpower, O&M, etc is to be paid. Rest, if applicable, can be arranged to be paid by the entity from other sources. An MoU between the parties is to reflect the same for a period of atleast 3 years. If the entity himself has the requisite technical expertise, and the same is approved by the STAC, the above allocation may not be necessary.

Model D: Any enterprise/entrepreneur capable of producing Bio-CNG is the entity

Eligibility and Role of the entrepreneur

Any eligible entity which shows willingness and capability shall be encouraged to set up a bio-mass treatment plant to produce high value output such as Bio-CNG, etc. He shall not be given any incentive and is open to have a buyback arrangement with any potential buyer such as Oil Marketing Companies (OMCs), hospitality partners, etc.

State shall facilitate Memorandum of Agreement between the Entity and OMCs for purchase/buyback purposes.

6. Role of GP

Once a project is selected, Gram Panchayat shall provide written consent to DWSC as means of approval. The GP shall be responsible for providing IEC and awareness on waste segregation, biogas and bio-slurry benefits and support the SHG Federation in managing bio-slurry, if required. GP shall ensure that bio-slurry from plants shall not be disposed in drains, or do not create disposal issues.

Only those Gram Panchayats which have not availed SLWM funds under SBM(G) are eligible to receive the financial assistance under GOBAR-DHAN scheme, subject to the limits of guidelines.

7. Role of Technical Agency

The technical agency can be a technical institute/NGO/ or similar entity with experience in designing and implementing biomass to energy projects. The selected technical agency is responsible for creating a project proposal in

consultation with the SHG. The project proposal shall detail out waste assessment, technology proposed, operational process, management of biogas and bio-slurry. Upkeep of plant is part of the agency's responsibility. Project proposal must include plan for management of biogas and bio-slurry produced.

The agency must be registered under Society Registration Act/Trust Act/Cooperative Act/ Companies act/ Partnership Act/ Proprietorship Act. The agency should have a valid Service Tax/VAT/TIN numbers for the line of business engaged in. The entity will have demonstrated capacity to run a biogas plant. Each plant shall have atleast one biomass aggregator, operator and a manager. The manager can oversee multiple projects, if the district has multiple projects. The personnel may be preferably from the project GP whose training shall be certified by BDTC/ NSDC. The aggregators can be engaged on input basis, and can be incentivized accordingly.

Equipment proposed for the project should be specified as part of DPR, to be approved by STAC. Sale of biogas can be done to either to the communities or to large scale consumers such as hotels, institutions, dairy farms, etc.

8. Role of State

The intended end objective of this model is to manage biodegradable solid waste and reduce the waste in villages considerably.

State must constitute a State Technical Advisory Committee (STAC), who shall support in selecting the technical agency and also approve project proposals submitted by the technical agency. State shall issue EoIs for empanelment of technical agencies which will support the selected applicants and for empaneling technologies. Similarly, an EoI for inviting interest from applicants, shall also be issued, preferably on the State website.

State shall empanel selected technical agencies based on eligibility and relevance. Existing BDTCs, NGOs or private agencies with proven record in implementation of biogas plants and with atleast 5 years of experience can be empaneled. Ideally, empanelment of technical agencies must precede before approving a project proposal. State shall be responsible for collecting information on local manpower/barefoot technicians identified by entities and ensuring their training through NSDC/BDTC.

DWSC at the district shall be the nodal agency for project approval and monitoring. Upon receiving of application from interested entities, the committee, headed by the District Collector/District Magistrate, shall evaluate the proposal and upon satisfactory evidence and viability, shall forward to the STAC. STAC shall evaluate the proposal, especially the technical soundness and share final approval.

An IEC strategy shall be prepared by the State to create awareness and to roll out the scheme. State/district must ensure IEC to villages on benefits of bio-waste management, biogas, bio-slurry benefits, etc. Capacity building of all relevant stakeholders including officers, PRIs and other stakeholders from project villages.

State must engage a third party to inspect all projects, irrespective of models. An EoI may be put up to invite competent agencies. Source of funding for engaging third party shall come from administrative component of SBM(G). Third party must inspect concurrently while the project is being set up.MIS reporting of all projects under GOBAR-DHAN shall be done similar to SBM(G).

Availability of adequate funds must be ensured before approving a project. State may ensure that households who have benefitted from a Central/State scheme may not receive benefit under GOBAR-DHAN, to avoid duplication of scheme benefits. The incentive amount shall be shared between Centre and State in 60:40 ratio. State may further incentive projects that use fecal sludge as bio-mass; this shall in case of septic tanks only and not for twin pits. States have the flexibility to dovetail funds from other schemes, if deemed necessary. Additional incentive may be given by State if fecal sludge is being used for biogas. State may also provide policy support for encouraging use of bio-slurry through buyback arrangements, marketing and promoting it as organic fertilizer.

Any of the above recommended four models or a combination of the models can be implemented in the selected GP, subject to incentive available.

9. Approval process of the project

i. State shall issue an Expression of Interest inviting applications from eligible applicants – SHGs, Gram Panchayats, Bulk Waste Generators and Entrepreneurs.

ii. The interested applicant shall submit his proposal based on assessment of waste and viability of the project. The selected entity shall visit the selected

Gram Panchayat/s and will obtain approval from Gram Panchayat for adopting GOBARDHAN project in their jurisdiction.

iii. On receipt of the approvalfrom GP, the entity will make a project proposal and submit to DWSC.

iv. The applicant must submit the following to DWSC at the time of submitting interest:

- Application of entity
- Detailed Project Proposal of the project
- Approval from Gram Panchayat
- Additional documents supporting the proposal, as prescribed

v. DWSC, chaired by District Collector/CEO, after scrutiny of the project proposal, along with GP's recommendations, shall forward the proposal to the State Technical Advisory Committee forscrutiny, especially for technical evaluation.

vi. State Technical Advisory Committee (STAC) shall evaluate and approve the proposals received by District. STAC shall be constituted at the State level with State Mission Director SBM (G) as Conven or, consisting of members from reputed NGOs, academic/technical institutes and technical experts. Concerned State departments such as animal husbandry, etc shall also be part of the committee.

The project preparation, supervision and monitoring costs of the projects payable to technical agencies may be made a part of the project cost itself.

Maintenance costs for the first five years of operation may be made a part of the project cost.

Each individual SLWM project may be approved at the DWSC level as per the technical and financial rules of the individual States.

Existing biogas projects under another government scheme or a private project shall not be eligible for the GOBAR-DHAN incentive.

10. Implementation Process

The project will be implemented based on the Detailed Project Report approved by the STAC.

Activity	Responsibility
Constituting STAC at State	State SBM(G) Mission Director
Issue of EoIs to empanel technical agencies and technologies	State/STAC
Issue of EoI for selection of Entity	State shall invite applications for selection of entities
DWSC receives applications from interested applicants	DWSC, headed by DC/DM/CEO to sanction administrative evaluation, shortlist and send to State
Technical Assessment &final approval of Proposal	State/STAC
Kickstart of project	DWSC facilitates process with entity, GP and selected technical agency
Selection of local manpower for operations, as required	Entity/GP shall identify and State shall facilitate skilling and certification through BDTC/NSDC
Release of Incentive: Model A: 50% of SLWM slab Model B: 50% of SLWM slab Model C: 40% of SLWM slab Model D: No incentive	Release of incentive is done by GP, approved by DWSC
Installation of plant	By Entity/ Technical Agency
Monitoring of projects	Project progress is monitored by DWSC/ STAC/ NTAC Timely payments are monitored by STAC
First instalment of the approved incentive amount	Incentive released by GP, approved by DWSC
Second installment of the approved incentive amount	Incentive released by GP, approved by DWSC

11. Implementing agencies/support agencies

States may choose to take support from BDTCs/State Nodal Agencies (SNAs) for Renewable energy such as PEDA/UPNEDA/GEDA/NEDCAP/KREDL/ANERT/TEDA/CREDA/ MPUVN/WBREDA/ OREDA/ UREDA/KVIC/ etc. Banks and Financial institutions such as NABARD, IREDA, PSBs can be contacted for additional financial support. Central and State Schemes such as MUDRA Yojana, may be dovetailed where applicable.

State may empanel technical agencies, biogas/bio-energy consultants, on their State website to be readily engaged by districts and entities. Reputed biogas equipment manufacturers may also be empaneled, to facilitate local manufacturing, supply and installation of biogas equipment.

12. Information, Education and Communication:

IEC/BCC activities should be carried out by State/district/Gram Panchayats to ensure sustainability of the projects. Assistance of professional agencies/NGOs may be sought to prepare/develop/test/implement such projects. Suggested IEC activities are included in annexure, for State and Districts to refer to.

13. Technical Advisory Committee

A National Technical Advisory Committee (NTAC) will be constituted at the Ministry of Drinking Water and Sanitation under SBM(G) for GOBAR-DHAN, for guiding the overall policy and advising the Ministry from time to time on technology, multi-sectoral practices, and approvals of specific projects. The constitution of the NTAC shall be the Ministry, members of academia, and technical experts.

States shall also constitute a State Technical Advisory Committee (STAC) for similar advisement. The constitution may be similar to NTAC, with strong emphasis on technical expertise and also members from allied sectors such animal husbandry, agriculture, etc.The terms of reference for STAC are annexed.

The quorum of the STAC required for approval should be atleast 60%. The State may ensure dealing of the proposals without undue delay. The committee will function for a period of atleast one year, until October 2019, to be extended as needed.

14. Release of incentive for the Project

The incentive amount shall be given as prescribed under Implementation Process. Fund flow for IEC, capacity building, and monitoring activities can be done through the Gram Panchayats, approved by DWSC.

Funds shall be released to entityon producing certificate of completion and certificate of functionality from the concerned DWSC.The bank account of the beneficiary may be linked to their Aadhar number, wherever possible. In order to implement DBT, Aadhar seeding of digitized beneficiary database has been mandated.

Any additional cost requirement is to be met by funds from the State/GP and from other sources like Finance Commission, CSR, Swachh Bharat Kosh and PPP model. Dovetailing funds from other programmes and sources of funding like MGNREGS, MPLAD, MLALAD funds, Finance Commission, CSR contribution, Swachh Bharat Kosh, donor funding, etc may be done. Entity can also avail financial assistance through MUDRA, NABARD etc., if required. Funding from programmes of other Ministries and departments may also be converged.

States may also decide to give additional incentive to projects that use fecal sludge as input for the biogas projects. However, twin pits may not be used for sludge as the sludge is meant to decompose within the pits.

A separate expenditure head shall be maintained for GOBAR-DHAN which captures incentive disbursement and any other expenditure made from other sources.The State may also examine its incentive structure if required, reorient it in such a way that promotes sustainability.

15. Monitoring

A national level monitoring system shall be developed into which States shall feed in project progress. Every project Gram Panchayat shall also maintain records of the project, to be reviewed periodically by State and any Central Government evaluator. Details of project including Gram Sabha resolution, number of beneficiaries benefitted, along with names and address, date of plant completion, date of commissioning, plant details, etc. shall be recorded. The GP shall have records of incentive disbursed to the entity along with dates of disbursement. If local villagers are engaged in the plant functioning, details of such manpower employed must also be maintained.

DWSC is the monitoring agency at the district level, where all the plants set up under GOBAR-DHAN scheme shall be physically verified during each quarter and the status of functionality shall be uploaded on the national MIS.

The projects shall be audited every year. State shall also set up independent evaluation mechanism to monitor functioning of plants installed and successful operation of the project vis a vis the objective of the scheme. This may be a bi-annual exercise, atleast for the first two years of the scheme.

State may also set up a call centre to receive grievances from villages and ensure redressal of the same in a timely manner.

Annexures

Terms of Reference for State Technical Advisory Committee (STAC)

The role of STAC, in addition to advising State SBM(G) department, is also to approve the Project proposals received under GOBAR-DHAN. More specifically, the STAC shall:

- Review and approve of the technology proposed, including the material of the components of the plant
- Ensure adherence of all proposed technology and material to BIS standards and avoid environmental concern
- Ensure every proposal submitted to the State, should be dealt within 15 days of receipt, with an approval or rejection
- Document minutes of each STAC meeting and upload on MDWS MIS
- Share quarterly report to MDWS on projects received, approved/rejected, progress of projects and issues at State
- Support State in empanelment of technical agencies that would support the entities at the field level
- Support State in approving the right entity and project proposal, based on capability, experience and potential for success of the project
- Review and document advantages and disadvantages/limitations of each technology and project proposal
- Examine environmental impact of each project and technology proposed
- To support State in appraising on new technologies in the sector, to keep them abreast of upcoming processes and best practices
- IOT inclusion for monitoring, especially for large projects is recommended
- No project can be allowed to let slurry become a waste/menace/dumped in drain

Format for Submission of Proposal for Installation of Community Level Biogas Plant

Applicant Information (Section I)		
1.	Name of the Applicant	First Name, Middle Name, Last Name
2.	Complete Address: Name of Village: Name of Gram Panchayat: Name of Block: Name of District: Name of State:	
3.	Contact person: Name & Designation: Mobile No.: Email ID: Bank Account number:	
4.	Type of Agency 1. GP: Letter head of the GP, signed by sarpanch and village officer 2. SHGs: Registered Entities, in existence for a minimum of 1 year since registration 3. Bulk waste generator: Certificate of registration (Gaushala, Poultry, Diary), Aadhar card of chair person 4. Entrepreneur: Registered Company/LLP/Sole proprietorship (TIN/PAN card)	
Comments of DWSC: 1. Gram Panchayat Letter for the support of the project 2. Relevant documents submitted are verified and found to be accurate		

LAND (Section II)		
5.	Proposed location of the project: Village Name: Patta Details (7/12): Total Area: Name of the owner: Name of the Applicant (if not same):	Attach copy of the Patta, If owner of land is not same as applicant then attach registered lease agreement
6.	Distance between the project site & where biomass is available (in mts.)	
7.	Accessibility to proposed location of the project Kutcha Road Pukka Road	
Comments of DWSC: 1. Ownership documents have been verified and found them to be accurate 2. Where owner and applicant are not same then lease agreement is examined and found to be valid		
Comments of STAC: 1. Ownership documents have been verifiedand found them to be accurate 2. Where owner and applicant are not same then lease agreement is examined and found to be valid		
Availability of Water (Section III)		
8.	Total water availability per day (in litres.)	
9.	On Site water source: Off Site water source: Distance in metres:	

10.	**Source of water** Well Hand pump Tube well Any Other: please specify			
Comments of DWSC: 1. Regarding Adequacy of waste being available throughout the year 2. Quality of waste (Segregated or Not)				
Comments of STAC: 1. Regarding Adequacy of waste being available throughout the year 2. Quality of waste (Segregated or Not)				
Availability of Raw Material (Section IV)				
11.	**Type: On Site (In -House)** Buffalos (Nos.) Calves Cows (Nos.) Calves Poultry (Nos.) Pig (Nos.): Crop waste (in Kgs.): Slaughter House (In Kgs.): Market yard: (In Kgs.) Others (Nos.)	**Nos**	**Kgs**	
12.	**Total (A)**			
13.	**Off Site (requiring transport)** Buffalos (Nos.) Calves Cows (Nos.) Calves Poultry (Nos.)	**Nos**	**Kgs**	

	Pig (Nos.): Crop waste (in Kgs.): Slaughter House (In Kgs.): Market yard: (In Kgs.) Others (Nos.)			
14.	**Total(B)**			
15.	**Grand Total (A+B)**			
Comments of DWSC: 1. Regarding Adequacy of waste being available throughout the year 2. Quality of waste (Segregated or Not)				
Comments of STAC: 1. Regarding Adequacy of waste being available throughout the year 2. Quality of waste (Segregated or Not)				
Collection Mechanism (Section V)				
16.	Total On site Bio mass (A)			
17.	Total Off site Bio mass (B) From bulk generator (B1): adjoining gaushala, markets, etc. From Households (B2):	Method of collection (tractor, cycle carts, trolley, etc.) – Number		
Comments of DWSC: 1. They have adequate (70% of total requirement) biomass on site 2. Transport mechanism from the various household in villages				
Comments of STAC: 1. They have adequate (70% of total requirement) biomass on site 2. Transport mechanism from the various household in villages				
Biogas Technology Used (Section VI)				
18.	Type of Technology: Fixed Dome Biogas plant Floating Dome Design Biogas Plant Prefabricated model Biogas Plant Bag Type Biogas Plant (Flexi model) Other			

19.	Size of biogas plant (in m3)	
20.	Biogas slurry whether to be used as: Production a. Liquid bio-slurry (or) b. Solid/dewatered/dried slurry fertilizer	
21.	Biogas slurry management	
22.	Biogas Storage	
23.	Biogas Purification/ enrichment technology (if any)	
24.	Smart biogas metering system (including pre-paid card option depending on size and type of plant, if any)	
25.	Special equipment (please mention, if any): • Warmer for heating during winter season: • Cutter: • Multiple digester: • Compressing Equipment: • Scrubber: • Carbon Dioxide Extraction Plant:	

Comments of DWSC:

1. The type of technology is suitable for the type of waste
2. Size of the plant is suitable for the quantum of waste generated (Digester design and size is suitable)
3. Biogas slurry management is suitable
4. Equipment being used are suitable

Comments of STAC:

1. The type of technology is suitable for the type of waste
2. Size of the plant is suitable for the quantum of waste generated (Digester design and size is suitable)
3. Biogas slurry management is suitable
4. Equipment being used are suitable

Post Treatment of Digested Slurry (Section VII)		
26.	Proposed specific uses of Biogas to 1. Commercial Entities: Industries, Dhabas, Hotels 2. Institutes: Hospitals, Colleges, Schools 3. Households 4. No. of connections to be provided 5. No. of families	What rate , specify (perm3)
27.	Proposed uses of Bio-CNG (in case produced)	
28.	Post treatment of bio-slurry (if any) Storage and packaging for bio-slurry (liquid and dewatered) and method of sale	
29.	Whether desired to run engine with gas If yes, Horse Power & make of engine	Yes/No
30.	Gas required for electricity generation If yes, No. of lights required Hours of use	Yes/No

Comments of DWSC:

1. Do they have tie-ups with any institution/commercial/individual for biogas sale?
2. Do they have tie-ups with any institution/commercial/individual for Bio-slurry sale?
3. Whether the sale price of biogas & bio slurry is as per market rates?

Comments of STAC: 1. Do they have tie-ups with any institution/commercial/individual for biogas sale? 2. Do they have tie-ups with any institution/commercial/individual for Bio slurry sale? 3. Whether the sale price of biogas & bio slurry is as per market rates?		
Technical Agency (Section VIII)		
31.	Name of the Technical Agency whose experience is sought:	
32.	Experience of Technical agency (with Details of Location of successful biogas plants)	
Comments of DWSC: 1. Technical agency has a good track record in the biogas sector		
Comments of STAC: 1. Technical agency has a good track record in the biogas sector		
Financing (Section IX)		
33.	DPR preparation cost	
34.	Cost of the Land (If any)	
35.	Land Development (If any)	
36.	Plant & Machinery	
37.	Electrical Installation (If any)	
38.	O &M costs (Raw material, manpower, utilities)	
39.	Total Cost	
Means of Finance (Section X)		
40.	Loan	
41.	Self-Funding	
42.	**Total**	
Comments of DWSC: 1. Applicant has convincingly proved that he has assessed the cost of the project correctly and has established his capacity to finance the same		

Comments of STAC:

1. Applicant has convincingly proved that he has assessed the cost of the project correctly and has established his capacity to finance the same

Other comments from DWSC shall address:

- If there is adequate waste available throughout the year
- If waste is of good quality, i.e segregated into dry waste and wet waste
- If plan for procurement of waste, both onsite and off-site is in place
- If land is in the name of the applicant or it is leased to him through a valid document
- If there is adequate availability of water necessary for running the plant
- If the applicant has been recommended by the Gram Panchayat
- If the applicant qualifies the selection criteria as laid out in the guidelines
- If the type of technology being used for the biogas is suitable for the waste available
- If the size of the biogas plant is commensurate to the waste availability
- If the biogas plant is being proposed in cold climate, suitable arrangements are made for heating
- If there are suitable arrangements for bio-slurry management (storage, disposal or sale and by not putting it in drain)
- If there is trained manpower available with the applicant and he is supported by empaneled technical agency (or an agency with a proven track record in biogas sector)
- If it is a viable project, i.e. revenue stream from biogas and bio-slurry sale and slurry are adequate for running the plant and for making payments to staff and farmers for their waste

Recommendations for IEC

IEC has potentially a high impact on the success of a pilot. Quality IEC will push the program in a positive direction in components of resources, infrastructure, institutions and behaviour. Biogas is being collected and used to generate electricity or steam at many landfills, wastewater plants. However, many opportunities for biogas production are yet to be implemented. There is a limited awareness of the potential and advantages of biogas production by citizens, government officials, and in the business sector that has limited interest in biogas production. More education, demonstration and investment in biogas technology would help overcome these barriers. Some of the aspects to be considered are:

- Enhancing awareness about GOBAR-DHAN scheme and animal waste management among population, especially women, farmers, entrepreneurs and Sarpanchs
- Positioning animal and bio-waste management, and GOBAR-DHAN scheme as an attractive proposition for various set of stakeholders to shift their attitude towards household, agricultural and animal waste and build their efficacy to manage waste at individual and collective level
- Creating a demand for use of products like bio-fertilisers, bio-gas produced by waste management initiatives in rural areas
- Highlighting positive deviants from the community (people, community groups and organisations) who are contributing towards solid and animal waste management in rural areas and have brought about a change
- Promoting use of scientific construction of bio-gas plants and use of personal protective equipment by bio-gas/ fertiliser plant workers and waste collectors
- Enhancing the recognition of potential of bio-waste management among key stakeholders like banking and financial institutions, corporates, media and training institutions, and work towards creating a facilitative environment for such initiatives
- Engage with district and state level officials to create an enabling atmosphere for management of bio-waste through entrepreneurship

S N	Main Purpose	Intended Audience	Duration / Periodic training	Platform Used	Key Messages
1	E.g. Enhancing awareness about use of slurry in agriculture	E.g. Farmers	E.g. 1 hour/ Bi-monthly	E.g. Radio Spots	*Increased crop production through use of bio-slurry*
					You can earn by selling the animal waste to your nearby bio-gas or bio-fertiliser producer.
2	E.g. Promoting use of bio-gas for cooking	E.g. Women	E.g. 1 hour/ Weekly	E.g. SHG meetings	*No smoke during use of biogas stoves; Biogas plants save time of cooking*
					Application of biogas for cooking can save approximately Rs. 6000 per annum per household.

Key Messages

Based on the audience segmentation described above, following are the key messages and platforms that can be used for dissemination of messages.

Audience	Messaging / Purpose	Key Questions	Potential platform(s)
Entrepreneurs	Animal, agricultural and domestic household bio-waste is not a waste – it is a useful resource. It can be used in the farms in the form bio-slurry, as cooking gas by households, and more importantly, it creates livelihood opportunities. It requires a minor investment to become a SLWM champion/ entrepreneur. Government is providing support to such entrepreneurs through its GOBAR-Dhan scheme. Support is available through GOBAR-Dhan scheme for setting up and operationalising social businesses for manufacturing compost, bio-slurry and biogas. It is a viable business and there are different funding sources and government schemes that can ensure success of these businesses.	1. What are the major applications of biogas plant? 2. What is the potential of implementation of biogas plant in India? 3. How can we compare the quality of biogas equivalent to other hydrocarbon fuels?	1. Radio spots 2. Gram Sabha meetings 3. Engagement with farmer clubs, youth clubs, SHGs, local market associations, bulk-waste generators
		4. What are the main objectives of the GOBAR-DHAN scheme? Is there any financial support by Govt. of India? 5. What support will be given to entrepreneurs who are working in rural areas	1. Newspaper ads 2. Radio spots 3. Posters and banners 4. Meetings by SBM nodal officers and banking and financial institutions
	Compost/ bio-slurry and bio-pesticides manufactured from bio-waste can be used for organic farming. With increasing demand for organic products, there is a high potential for such products in the market. Therefore, come forward, use this opportunity and become a GOBAR-Dhan entrepreneur.	6. Is it possible to replace inorganic fertilizers totally? 7. What does Bio CNG means? What will be the major application area for Bio-CNG?	1. Media articles/ stories on success of various models 2. Films on success stories

	There are people in the community who have already set up social businesses for bio-gas, bio-fertilisers, and they are earning profit out of it. So, here is your chance to learn from them, and this is the best time to start such business as support through GOBAR-Dhan scheme is also available. Produced biogas was used for cooking by most of the owners and for lighting by some of the owners.	8. Is there any financial benefit to entrepreneur for taking such projects?	1. A series of motivational films for social media 2. Engagement with media to identify and broadcast such stories 3. Media articles/ stories on successful businesses
Farmers	Be a progressive farmer. Move towards organic cultivation. Bio-fertilisers i.e. bio-slurry and compost are available in your nearby market. Use it to enrich your soil with nutrients and enhance the quality of your produce. Bio-slurry used by most of all biogas plant owners, mostly as fertiliser but also as fish feed	1. What are the uses of biogas slurry 2. What are the benefits of other nutrients in biogas slurry? 3. Is there any condition for claiming CFA on biogas plant?	1. A series of radio spots 2. Street plays 3. Meetings/ IPC activities with farmer clubs 4. Demonstration sessions with farmers 5. Films on farmers who are leaders in organic farming
	Organic cultivation is the future. It is not just sustainable (environment-friendly) but it is also more attractive and profitable. More and more people are switching to organic products. Use bio-slurry and compost for your crops and give new direction to your agriculture. Increased crop production through use of bio-slurry	4. I am switching over to biogas slurry from fertilizers. I think I will get more yield from today. Is it right? 5. What are the main objectives of the GOBAR-DHAN scheme? Is there any financial support by Govt. of India?	

Women	Switch to bio-gas and stop using wood/ charcoal for cooking food. It is a safe option as you don't need to go out to collect wood from forest. You also get rid of the smoke. You can earn by selling the animal waste to your nearby bio-gas or bio-fertiliser producer. Most of the female users mentioned that the amount of gas was sufficient to meet the cooking needs. No smoke during use of biogas stoves; Biogas plants save time of cooking Cooking utensils do not become dirty Application of biogas for cooking can save approximately Rs. 6000 per annum per household. Approximately 90% of female users mentioned Biogas plant is a time saving product.	1. What are the major applications of biogas plant? 2. For an 8 member family, what will be the capacity of the biogas plant to meet their daily energy requirements? 3. What are the main objectives of the GOBAR-DHAN scheme? Is there any financial support by Govt. of India?	1. Gram Sabha meeting and special Mahila Gram Sabha 2. SHG meetings 3. Street plays 4. Community radio messages
Sarpanches (Gram Panchayat)	Role of Gram Panchayats in ensuring segregation of waste at the source, and how this is going to benefit both people and village itself i.e. by having its own source(s) of bio-energy and bio-fertiliser. This will also ensure that village remains clean.	1. What is the potential of implementation of biogas plant in a village? 2. What are the main objectives of the GOBAR-DHAN scheme? Is there any financial support by Govt. of India?	1. Module/ Handbook for Gram Panchayats on solid and animal waste management 2. Films on the role of Sarpanches/ village heads

	Facilitative role of Gram Panchayats in setting up and operationalising social businesses for solid and liquid waste management in villages. For example, Panchayats can provide land for setting up such businesses, electricity and water for running waste management businesses. This can be a source of revenue for the Panchayats.	3. A biogas plant can be constructed by a skilled and trained labour. How we can contact with those trained biogas masons? 4. Are there any criteria for selection of best site for installation of biogas plant 5. How much area is required for installing a biogas plant?	3. Meetings with Gram Panchayat members/ Sarpanches
	How Sarpanches/ Panchayats have played a role in managing solid and liquid waste within their villages. How they contributed towards creating self-sufficient villages, and in promoting organic cultivation – bioenergy and biofertilizer.	6. Does the biogas plant smell bad	

Frequently Asked Questions

1. What are the major applications of biogas plant?

Biogas plant produces biogas and bio manure. Biogas can be used for thermal application like cooking, lighting and power generation through diesel/petrol gensets. Bio manure can be used as fertilizer in agriculture. Bio manure increases annual grain yield.

2. How can we compare the quality of biogas equivalent to other hydrocarbon fuels?

Quantities of various hydrocarbon fuels that will have energy equivalent to 1m of 3 biogas are given in as under:

Name of the fuel	Kerosene	Firewood	Cow dung	Charcoal	Furnace oil	Electricity	LPG
Equivalent quantity to 1m3 of biogas	0.60 lit.	3.50 kg	12.3kg	1.50 kg	0.40 lit.	4.70kWh	0.43 kg

3. What does Bio CNG mean? What will be the major application area for Bio-CNG?

Bio - CNG can be injected into the gas network or compressed for use in natural gas vehicles. Once fed in the gas network, it can provide domestic or commercial cooking and heating, or be used as vehicle fuel in locations remote from the source of the gas.

4. What are the uses of biogas slurry?

- Increase of micronutrients in the soil.
- Improved drainage and better aeration to the root system.
- Improvement in the soil structure
- Biogas slurry is also being used for fish culture, which acts as a supplementary feed.
- Biogas slurry can be also used for the production of bio fertilizers like Azolla and aquatic biomass Spirulina

5. Does switching over to biogas slurry from fertilizers get more yield soon?

There will be no instant increase in production due to the switch over. In fact, initially there will be decrease in the yield. But over a period of two to five years, there will be an increase in the quantity and quality of the yield.

6. How we can contact trained biogas masons?

A list of empanelled BDTC trained/ NSDC certified masons will soon be uploaded on the respective State website

7. Are there any criteria for selection of best site for installation of biogas plant?

Following points should be considered while selecting a site for installation of biogas plant-

- The site for biogas plant should be at higher level as compared to the surroundings, so that there should not be accumulation of water near the biogas plant.
- Biogas plant should be installed at least 2 meter away from the foundation of the house to avoid cracks in the building.
- Biogas plant should be installed near the kitchen and animal shed to save cost of delivery gas pipe and carriage of dung.
- Biogas plant should be installed in the open space. There should not be any tree near the plant, so as to have full benefit of sunlight and also the roots of the tree should not damage the biogas plant.
- Biogas plant should be installed underground to avoid the cracks in the dome (gas holder).

8. Does the biogas plant smell bad?

In case of appropriate operation, a biogas plant does not release any bad odour into the environment.

Thumb rule for sizing of plant:

- Cattle dung based biogas plant sizing: An average of 15 kg of cattle dung is collected from an animal, every day. About 1.0 m3 of biogas is collected from 25 kg of cattle dung. Hence, 2-3 animals are required for 1.0 m3 plant.
- Human excreta based biogas plant sizing: An average of 0.4 kg of human excreta is collected from an adult human. Each kg of human excreta can generate 0.07 m3 of biogas. Hence, about 14 kg excreta or 35 persons are required each day to run a 1 m3 biogas plant.
- Poultry droppings based biogas plant sizing: 250 – 300 poultry birds are required per m3 capacity of biogas plant; the gas production from this plant can be increased upto 6 times