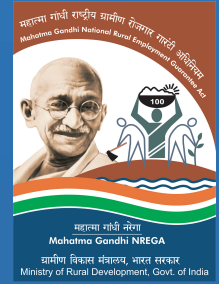


सत्यमेव जयते



# OPERATIONAL MANUAL FOR CONSTRUCTION OF BIO GAS PLANT UNDER MAHATMA GANDHI NREGA

July, 2022

**Department of Rural Development  
Ministry of Rural Development  
Government of India**



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# Part-A

## 1. Bio Gas as a source of renewable energy

**Bio Gas:** Biogas is an energy-rich gas produced by anaerobic decomposition of biomass. Biogas is composed mostly of methane (CH<sub>4</sub>), the same compound as in natural gas, and carbon dioxide (CO<sub>2</sub>). The methane content of raw (untreated) biogas may vary from 40%--60%, with CO<sub>2</sub> making most of the remainder along with small amounts of water vapor and other gases. Biogas can be burned directly as a fuel or treated to remove the CO<sub>2</sub> and other gases for use just like natural gas. Treated biogas may be called *renewable natural gas*.

**Bio Gas Plant:** Bio gas plant may be the medium to address the livelihood problem and a unique alternative renewable energy source for the rural poor. Biogas is practically produced as landfill gas (LFG) or digester gas using anaerobic digesters. These plants can be fed with mainly animal dung, energy crops such as maize silage or biodegradable wastes, food waste etc.

During the process, an air-tight tank transforms biomass waste into methane producing renewable energy. Landfill gas is produced by wet organic waste decomposing under anaerobic conditions in a landfill. The waste is covered and mechanically compressed by the weight of the material that is deposited from above. This material prevents oxygen exposure thus allowing anaerobic microbes to thrive.

**Model of Bio Gas Plant:** There are many models of bio gas plants available for installation. The fixed dome model has many advantages to the others. It is a low cost model and the construction can be done with local available materials and local mason with the help of individual. The success rate of this model is high as the dome is underneath the ground and there is no movable part, so no wear and tear arises. There is no maintenance required for the fixed dome model.

The 2 cubic meter fixed dome model is best suited for a family of 5 members. It requires cow dung from 3 to 4 cattle and it produces sufficient gas (approximately 0.4 cubic meter) for the family for their daily consumption.

The Ministry is open on the model and size for community biogas plant in which unskilled wage component towards construction of biogas plant for community is permissible.

### **Benefits of Bio Gas Plant**

- **Energy benefits**

- Provides cooking and heating fuel (stoves and burners 55 % efficient)
- Lighting fuel (biogas lamps with mantles)

- **Environmental and social benefits**

- Significantly reduce carbon dioxide emission and reduces pressure on fuel wood. Biogas is a clean source of energy (no smoke and soot during combustion). The Biogas plant produces pathogen free nutrient rich fertilizer. It also reduces unhygienic conditions due to scattering of wastes. It also turns sterile cattle as an economic asset, therefore, encouraging farmers to keep the cattle with them rather than letting them loose or selling to slaughterhouses.

- **Economic benefits**

- Cheaper source of cooking energy (a 2 cubic meter biogas plant can replace, in a month, fuel equivalent to 26kg of LPG, or 37 litres of kerosene, or 88kg of charcoal, or 210kg of firewood)
- It converts waste to wealth , gets benefit without capital investment.

Biogas has emerged as an ideal solution for addressing rural energy needs on a sustainable basis without contributing to accretion of greenhouse gases, and therefore, in sync with the commitment of the nation of meeting 50 % of its energy needs by 2030 from renewable sources. It further, reduces the need to import costly gas and pressure on forex as well as ensuring more degree of energy sovereignty.

It is with this in view, Mahatma Gandhi National Rural Employment Guarantee Scheme (Mahatma Gandhi NREGS, also hereinafter referred as Scheme) has now included investment in bio-gas units as a permissible work category.

## **2. About Mahatma Gandhi NREGS**

Mahatma Gandhi National Rural Employment Guarantee Scheme (Mahatma Gandhi NREGS, also hereinafter referred as Scheme) is a demand driven wage employment scheme.

This Scheme guarantees at least 100 days of unskilled wage employment against the demand by an adult member of a rural household.

The core objectives of the Scheme are the following:-

- A. Providing not less than one hundred days of unskilled manual work as a guaranteed employment in a financial year to every household in rural areas as per demand, resulting in creation of productive assets of prescribed quality and durability;
- B. Strengthening the livelihood resource base of the poor;
- C. Proactively ensuring social inclusion; and
- D. Strengthening Panchayat Raj institutions.

Provided that the said objectives are applicable where the adult members volunteer to do unskilled manual work subject to the conditions laid down by or under this Act and in the scheme.

The works to be taken up under the Scheme are planned, prioritized and approved in the Gram Sabha at the Gram Panchayat level. Accordingly shelf of work is prepared at the Gram Sabha with submission to Programme Officer(PO) at Block level and subsequently approved at the District level by District Programme Coordinator (DPC).

The broad category of works under the scheme are as under:

- I. Category A : Public works relating to Natural Resource Management;
- II. Category B: (Community assets or Individual assets) for vulnerable sections (only for households in Paragraph 5)
- III. Category C: Common Infrastructure [including for NRLM] compliant Self Help Groups
- IV. Category D : Rural Infrastructure

According to the above categories and the detail of works mentioned in the categories of the Schedule I of the Mahatma Gandhi NREG Act, there are 262 (or 265, as has been mentioned in several documents) permissible works out of which 67 works are related to individual beneficiary.

The construction of Biogas plant of capacity of 2 cubic meter for individual beneficiaries eligible as per Schedule-I, para 5 of

the Act is now a permissible work under Mahatma Gandhi NREGA. (A copy of notification is attached at annexure-I).

It may be mentioned that unskilled wage component for the community Biogas plant is permissible under Mahatma Gandhi NREGA. (A copy of notification is attached at annexure-I), however, as community biogas plants not only require more investment and requires relatively more developed social capital and a reasonably sophisticated operating structure, besides the need for either laying gas pipeline or bottling it, both of which would require substantial capital.

The non negotiable of Mahatma Gandhi NREGA such as three stage geo tagging of assets, compulsory social audit, maintaining 60: 40 ratio at the district level, transparency, accountability, non-engagement of contractor, no labour displacing machine etc. should be followed while implementing the work.

3. **Implementing Agency:** *As the initiative is predicated upon the energy of the **individual households eligible to receive NREGS assets and leverages the cattle or other waste for production of biogas**, it is proposed that Cluster Level Federations (CLF) may be chosen as the PIA, as they would not only be able to mobilize the poor households but also ensure follow-up, educate the communities on upkeep, do routine maintenance of the biogas plants and so on. Even where the CLFs are not chosen as PIAs, it will be necessary to associate the Village Organisation or Dairy cooperative in implementation and through them enthusiastic SHG Members who would be willing to take on the task of Biogas CRP (Biogas Didi).*
4. **Implementation Strategy:** This initiative will be implemented on a saturation basis in the chosen GPs, as it will be possible to provide necessary technical support, train and handhold community cadres and masons, monitor the progress of implementation with greater ease and through a community of users, necessary motivation and mutual learning will be possible. For every such community, a community worker will be supported known as Biogas Didi. For mobilisation purposes, support of CRPs (Biogas Didis) may be taken. The Technical



Support Agency may ensure their training, exposure visits and handholding during the construction and post-implementation phase. The payment of Biogas Didis will be made by Technical Support Agency, selected for this purpose.

5. **Role of the CLF:** The State may assign the Cluster Level Federation (CLF) under DAY-NRLM for implementation of the Bio gas plant in the rural areas.

#### **Role of CLF under DAY-NRLM on Bio Gas plant**

- The CLF will facilitate the Gram Panchayat for selection of eligible beneficiary as per the Act.
  - The CLF will facilitate the beneficiary for implementation of the Bio gas plant through orientation of beneficiaries, mobilisation of materials, masons and follow up through Village Organisations (VOs).
  - The CLF will be the Programme Implementing Agency (PIA) for construction of individual biogas plant of 2 cubic meter.
  - CLF as PIA for Mahatma Gandhi NREGA works, will ensure compliance of directives issued (time to time) by Department of Rural Development, Government of India.
  - CLF will sponsor SHG member for the role of Biogas Didi and would be accountable for their uptime, periodic maintenance and also orientation of farmers on use of slurry.
  - CLF may also organise further processing of liquid slurry at community plants into value added products and its sale and disposal to and orientation of farmers into their use with support from the Technical Support Agency.
6. **Training:** The State may impart training to the following on Bio Gas Plant:-
    - Training to the CLF members on the implementation strategy, their role;
    - Training to the technical officers on technical aspects and the implementation strategy;
    - Training to the mason on construction of Deenbandhu biogas plants;
    - Training to programme officials on the implementation aspects and community mobilization.

## 7. Technical Assistance

- It is important to associate a competent Technical Support Agency to support the implementation, as there are many areas where without the advice by experienced agencies, the project may not succeed. The State Government will finalize appropriate Agency by following due procedure of the Scheme for technical assistance from the agencies as empanelled by Department of Rural Development, Government of India for this purpose. Draft TOR for selection of the TSA would be separately conveyed to the State/UT Govts. The selection of TSA by the State would be as per its as per its General Financial Rule.

## 8. Selection of the beneficiary

- I. The beneficiary for Bio gas plant should be selected as per the beneficiary mentioned in Para 5 in the Schedule of Mahatma Gandhi NREGA (attached).
  - II. A suitable list of eligible household should be prepared at the GP level and scrutinized at the Gram Sabha for construction of Biogas plant.
  - III. The beneficiary household should have at least 3 to 4 cattle.
  - IV. The beneficiary household should have sufficient land available near the house for construction of Biogas plant.
  - V. As far as possible, the implementation should be taken on a saturation basis, and technical support should be available for even those HHs, who are not eligible for schematic support from MGNREGS.
9. **Purchase of Material:** Individual beneficiary household may purchase materials for the Biogas plant in the same manner as followed for the individual works on private lands such as farm ponds, dug wells, IHHLs etc. at the rates approved by the competent authority, from any vendor having TIN number.
10. **CLF as PIA:** The CLF as PIA, will ensure proper Social Audit as per the provision under Mahatma Gandhi NREGA.
11. **Responsibility of Maintenance Agency:** During the maintenance period, the maintenance agency will maintain a log book capturing the operational status of the plant.
12. **Certification of completion of constructed Biogas Plant:** The agency selected for technical assistance should certify the fitness of constructed Biogas plant.

- 13. Technical Specification for Biogas Plant:** The Biogas plant may be constructed as per the technical manual provided in Part-B of this document.
- 14. Biogas Action Plan:** The initiative aspires to encourage largescale adoption of biogas as source of energy and farm nutrients for the adoptee households so as to reduce their dependence on fossil fuel based sources. In line with country's goal of meeting 50 % of its enregy needs with renewable sources of energy, largescale deployment of individual and community biogas plants is required. **It is proposed to choose 1 such Gram Panchayat or its equivalent for intensive deployment of biogas plants on saturation basis for every block of the country in the FY 2022-23 with the idea that each such GP serves as a demonstration site for its further scaleup in the coming years.**

Following components may be included in the Action Plan for 2022-23:

- I. Careful selection of demonstration Gram Panchayat for its initial rollout in coordination with State Dairy Federations, Milk producer companies, SRLMs, State Renewable Energy Development Agencies;
- II. Identification of Implementation Agencies, preferably CLFs;
- III. Orientation of stakeholders and especially community where initial rollout would be made;
- IV. Identification / training of key skilled manpower viz. masons for the Deenbandhu model;
- V. Selection of the Technical Support Agency;
- VI. MIS for monitoring of the implemntation and operation;
- VII. SOPs for handholding of the communities through Biogas Didi
- VIII. Monitoring and evaluation of performance for lessons for its scaleup
- IX. Scaleup plan in the succeeding years and prepartion of the manpower viz. masons, biogas Didi etc.

**Each State would share their Biogas Action Plan for the year 2022-23 with the Ministry as soon as possible.**

# Part-B :- Technical Specification for Biogas Plant

Detail estimate for Construction of Biogas Plant 2 cum (including material, labour, transporation etc)-  
Indicative Rate of labour & material

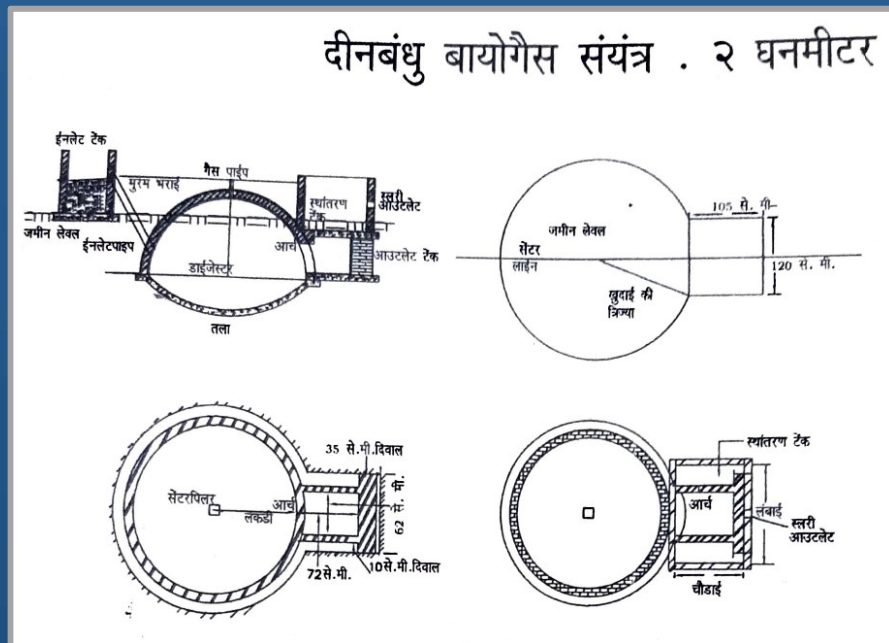
Design construction and Estimate based on BIS Code of Biogas IS 456-2000 and Mode of Measurement respectively

Sl No	Item of work	Nos	Constant	Length/ Radius	Width/ Radius	Depth Max.	Calculation for	Unit	Quantity	Rate	Amount
1	Survey, Site clearing and demarcation etc							No	1	200.00	200.00
2	Excavation in Shoft or hard Starrata-designer	1.00	3.14	1.60	1.60	1.06	Volume	m <sup>3</sup>	8.52		
	Curvature	1.00	3.14	1.60	1.60	0.50	Volume	m <sup>3</sup>	4.02		
	Outlet channel	1.00	1.00	1.20	1.20	0.90	Volume	m <sup>3</sup>	1.30		
	Inlet Tank	1.00	1.00	1.20	1.20	0.20	Volume	m <sup>3</sup>	0.29		
	Relacement Tank	1.00	1.00	2.20	1.20	0.50	Volume	m <sup>3</sup>	1.32		
	Slurry Tank	1.00	1.00	3.00	2.00	1.00	Volume	m <sup>3</sup>	6.00		
									21.44	105.26	2257.19
3	Back Filling	2	3.14	1.45	1	1.06	Volume		9.65	127.20	1227.78
4	RCC/PCC 1:2:4 in foundation of digester, inlet Tank outlet replacement Tank										
	Area of Excavation	1.00	3.14	1.6	1.6	0.1	Volume	m <sup>3</sup>	0.80		

Sl No	Item of work	Nos	Constant	Length/ Radius	Width/ Radius	Depth Max.	Calculation for	Unit	Quantity	Rate	Amount
		1.00	1.00	1.2	1.2	0.1	Volume	m <sup>3</sup>	0.14		
		1.00	1.00	1.2	1.2	0.1	Volume	m <sup>3</sup>	0.14		
		1.00	1.00	2.2	1.2	0.1	Volume	m <sup>3</sup>	0.26		
		1.00	1.00	32		0.1	Volume	m <sup>3</sup>	0.60		
									1.96	5802.80	11349.35
5	Brick work 350 th with 1:5 cement mortar	1.00	1.00	1.2	0.35	0.40	Volume	m <sup>3</sup>	0.17	4700.00	789.60
6	Brick work 4" in dome, outlet, circular inlet, replacement Tank	2.00	3.14	1.38	1.38	1	Area	m <sup>2</sup>	11.96		
		2.00	1.00	0.70	1.00	0.55	Area	m <sup>2</sup>	0.77		
		2.00	3.14	0.30	1.00	0.9	Area	m <sup>2</sup>	1.70		
		2.00	1.00	1.75	1.00	1.1	Area	m <sup>2</sup>	3.85		
		2.00	1.00	1.10	1.00	1.1	Area	m <sup>2</sup>	2.42		
										20.70	450.00
7	20mm Plaster in 1:4 two times of Brick Area										
	dome outside	2	3.14	1.38	1.38		Area	m <sup>2</sup>	11.96		
		2	3.14	1.28	1.28		Area	m <sup>2</sup>	10.29		
	Area of Curvature	2X3.142X (L+0.4L+0.4)									
		2	3.14	1.02					6.41		
Inlet inside out side	3	3.14	0.7	0.9		Area	m <sup>2</sup>	5.93			
Outlet	2	3	0.65	0.65		Area	m <sup>2</sup>	2.54			
Replacement Tank	2	2	1.75	1		Area	m <sup>2</sup>	7.00			

SI No	Item of work	Nos	Constant	Length/ Radius	Width/ Radius	Depth Max.	Calculation for	Unit	Quantity	Rate	Amount
		2	2	1.1	1		Area	m <sup>2</sup>	4.40		
	Bottom	1	1	1.85	1.2		Area	m <sup>2</sup>	2.22		
									50.74	180.00	9133.92
8	Cement punning								50.74	23.00	1167.11
	Rienforcement 6mm						Weight	kg	35	82.00	2870.00
	First feeding slurry						Volume	KL	4	300.00	1200.00
	Gas value 1 inch						Brass		1	175.00	175.00
	Gas stove double burner										
	HDPE pipe 1/2"							mt	50	32.00	1600.00
	GI Gas outlet 1"12"							No.	1	110.00	110.00
	Surry inlet 4" PVC pipe 5 feet							No.	1	150.00	150.00
<b>Total:</b>											41542.80

Labour	17277.1	41.59%
Material	24265.70	58.41%



Dimension using in construction of deenbandhu plant				
Sr No	Particulars	Unit	2 cum	3 cum
1	Digester's Radius	cm	128	146
2	Excavation Radius	cm	160	180
3	Excavation depth	cm	95	105
4	Curvature depth	cm	65	58
5	Opening ht fro 00 line	cm	55	66
6	Outlet Chamber	cm	72 x 62	72 x 62
7	Outlet chamber Ht	cm	65	78
8	Replacement Tank	cm	165 x 100	233 x 100
9	Slurry Outlet ht	cm	40	43
10	Slurry Inlet pipe	cm	155	165
11	Gas Outlet GI Nipple 1"	cm	30	30
Biogas Development Training Centre, Indore, MP				

## Annexure

रजिस्ट्री सं. डी.एल.- 33004/99

REGD. No. D. L.-33004/99



# भारत का राजपत्र

## The Gazette of India

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असाधारण  
EXTRAORDINARY

भाग II—खण्ड 3—उप-खण्ड (ii)  
PART II—Section 3—Sub-section (ii)

प्राधिकार से प्रकाशित  
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NEW DELHI, FRIDAY, APRIL 8, 2022/CHAITRA 18, 1944

ग्रामीण विकास मंत्रालय

अधिसूचना

नई दिल्ली, 8 अप्रैल, 2022

का.आ. 1719(अ).—केंद्रीय सरकार, महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार गारंटी अधिनियम, 2005 (2005 का 42) की धारा 29 की उपधारा (1) द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए, यह समाधान हो जाने पर कि ऐसा करना आवश्यक और समीचीन है, उक्त अधिनियम की अनुसूची 1 में निम्नलिखित और संशोधन करती है, अर्थात् :—

महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार गारंटी अधिनियम, 2005 की अनुसूची 1 में, पैरा 4 के उपपैरा (1) की मद (2) में, उप-मद (vi) के पश्चात् निम्नलिखित उप-मदें अंतःस्थापित की जाएंगी, अर्थात् :—

(vii) व्यक्ति के लिए बायो-गैस संयंत्र का संनिर्माण; और

(viii) समुदाय के लिए बायो-गैस संयंत्र का संनिर्माण अकुशल मजदूरी घटक हेतु।

[फा. सं. जे-11017/01/2022-आरइ-VII]

रोहित कुमार, संयुक्त सचिव

टिप्पण : महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार गारंटी अधिनियम, 2005 (2005 का 42) की अनुसूची 1 संख्यांक का.आ. 323(अ), तारीख 6 मार्च, 2007 द्वारा पहली बार संशोधित की गई थी और संख्यांक का.आ. 4598(अ), तारीख 3 नवंबर, 2021 द्वारा अंतिम बार संशोधित की गई थी।

2535 GI/2022

(1)



**MINISTRY OF RURAL DEVELOPMENT**  
**NOTIFICATION**

New Delhi, the 8th April, 2022

**S.O. 1719(E).**—In exercise of the powers conferred by sub-section (1) of Section 29 of the Mahatma Gandhi National Rural Employment Guarantee Act, 2005 (42 of 2005), the Central Government, on being satisfied that it is necessary and expedient to do so, hereby makes the following further amendments in the Schedule-I to the said Act, namely:-

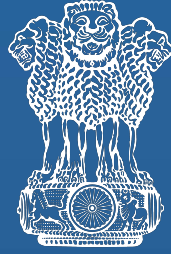
In the Mahatma Gandhi National Rural Employment Guarantee Act, 2005, in Schedule I, in Paragraph 4, in sub-paragraph (1), in item (II), after sub item (vi) the following sub-items shall be inserted, namely:-

- (vii) construction of bio-gas plant for individual; and
- (viii) unskilled wage component towards the construction of bio-gas plant for community.

[F. No. J-11017/01/2022-RE-VII]

ROHIT KUMAR, Jt. Secy.

**Note :** SCHEDULE 1 of the Mahatma Gandhi National Rural Employment Guarantee Act, 2005 (42 of 2005) was first amended vide number S.O. 323(E), dated the 6<sup>th</sup> March, 2007 and lastly amended vide number S.O. 4598(E) dated the 3<sup>rd</sup> November, 2021.



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Department of Rural Development  
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