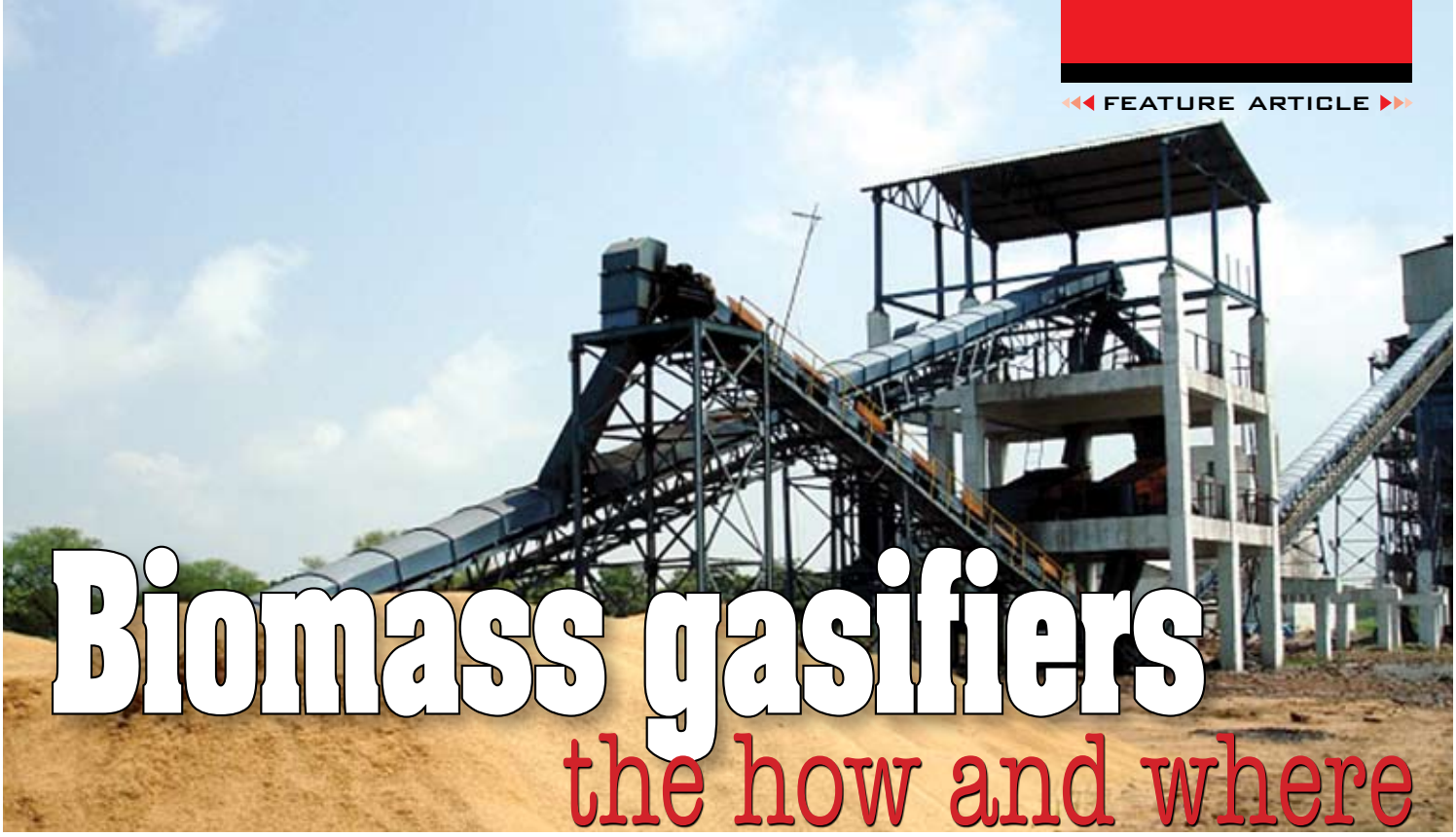

Biomass gasifiers
the how and where

DR A K TRIPATHI, Director, MNRE

Biomass has been one of the main energy sources for mankind ever since the dawn of civilization although its importance dwindled after the expansion in use of oil and coal in the late 19th century. There has been a resurgence of interest in the recent years in biomass energy in many countries considering the benefits it offers. It is renewable, widely available, and carbon neutral and has the potential to provide significant productive employment in the rural areas. Biomass is also capable of providing firm energy. Estimates have indicated that 15%–50% of the world's primary energy use could come from biomass by the year 2050. Currently, about 11% of the world's primary energy is estimated to be met with biomass.

For India, biomass has always been an important energy source. Although the energy scenario in India today indicates a growing dependence on the conventional forms of energy, about 32% of the total primary energy use in the country is still derived from biomass and more than 70% of the country's population depends upon it for its energy needs.

The Government of India through the MNRE (Ministry of New and Renewable Energy) has been aware of the potential and role of biomass energy in the Indian context and hence has initiated a number of programmes for promotion of modern technologies for its use in various sectors of the economy to ensure derivation of maximum benefits. Biomass power generation in India is an industry that attracts investments of over Rs 600 crore every year, generating more

than 5000 million units of electricity and yearly employment of more than 10 million man days in the rural areas. The three main technologies being promoted by the MNRE for productive utilization of biomass are bagasse-based cogeneration in sugar mills, biomass power generation, and biomass gasification for thermal and electrical applications.

Biomass gasification for thermal and electrical applications

What is biomass gasification?

Biomass gasification is thermo-chemical conversion of solid biomass into a combustible gas mixture (producer gas) through a partial combustion route with air supply restricted to less than that theoretically required for full combustion. Typical composition of producer gas is as follows.

Carbon monoxide	18%–20%
Hydrogen	15%–20%
Methane	1%–5%
Carbon dioxide	9%–12%
Nitrogen	45%–55%
Calorific value	1000–1200 kCal/m^3

Why gasify biomass?

- Producer gas can be used as a fuel in place of diesel in suitably designed/ adopted IC (internal combustion) engines coupled with generators for electricity generation.
- Producer gas can replace conventional forms of energy such as oil in many heating applications in the industry.
- The gasification process renders the use of biomass relatively clean and acceptable in environmental terms.
- Large monetary savings can accrue through even partial substitution of diesel in existing DG (diesel generator) sets.

What type of biomass can be gasified?

Most commonly available gasifiers use wood/woody biomass; some can use rice husk as well. Many other non-woody biomass materials can also be gasified, although gasifiers have to be specially designed to suit these materials and the biomass may have to be compacted in many cases.

Typical capacities

Biomass gasifier based systems are being made in capacities ranging from few kilowatts to a megawatt of electricity equivalent. For heating applications, the current upper limit on the unit size is equivalent to 200–300 kg/hour of oil consumption.

Costs

The typical costs of biomass gasifier based power generation systems range from Rs 4 crore per MWe to Rs 4.5 crore per MWe. The cost of electricity generation depends upon the cost of biomass, plant load factor, and so on and is estimated to be between Rs 2.50/kWh (kilowatt-hour) and Rs 3.50/kWh. For thermal applications, the capital costs

are estimated to be about Rs 0.5–0.7 crore for each one million kCal capavity.

Financial incentives

Central financial assistance/grants-in-aid being provided under the MNRE programme are given below. For further details visit <www.mnre.gov.in>.

Capital subsidy

1. Biomass gasifier for thermal and electrical applications in industry
   i) Rs 2 lakh/300 kWth for thermal applications.
   ii) Rs 2.50 lakh/100 kWe for electrical applications through dual fuel engines.
2. Biomass gasifiers coupled with 100% producer gas engine in industry.
   i) Rs 10 lakh/100 kWe for 100% producer gas engine with gasifier systems.

   ii) Rs 8 lakh/100 kWe for 100% producer gas engine alone.

3. Institutional gasifier systems
   i) Rs 15 lakh/100 kWe for 100% producer gas engine coupled with gasifier system.
   ii) Rs 10 lakh/100 kWe for 100% producer gas engine alone.

4. Capital subsidy for biomass cogeneration (non-bagasse) projects.

Capital subsidy at the rate of Rs 20 lakh/MWe would be provided to promoters for installation of biomass cogeneration (non-bagasse) projects, including captive projects based on direct combustion.

Technology and equipment

There are about a dozen known manufacturers in the country for gasification systems. A list of these manufacturers is given below.

Dr B C Jain, Managing Director
Ankur Scientific Energy Technologies Pvt. Ltd
Near Old Sama Jakat Naka, Vadodara – 390 008
Tel. 793 098, 794 021 • Fax (0265) 794042
E-mail ascent@wilnetonline.net

Mr G M Satyanarayana, Managing Partner
Associated Engineering Works
P B No.17, Gamini Compound, Chivatam Road
Tanuku – 534 211
Tel. 08819 22950 • Fax 08819 24801

Mr BV Ravi Kumar, Director
M/s Cosmo Powertech Pvt. Ltd
Devpuri, Near Jain Public School
Dhamtari Road, Raipur – 492 015
Tel. 0771 501 1262 • Fax 0771 501 0190
E-mail cosmo_powertech@yahoo.co.in

Mr J Mukherjee, Director
Grain Processing Industries (I) Pvt. Ltd
29, Strand Road, Calcutta – 700 001
Tel. (033) 243 1639/210 1252
Fax 91 33 220 4508/210 3368

Dept of Aerospace Engineering
Indian Institute of Science
Bangalore – 560 012
Tel. 080 2334 8538, 2309 2338
Fax 080 2334 8536/1683

Mr K Ramachandra
M/s Netpro Renewable Energy (India) Ltd
139/B, 10th Main, Rajamahal Vilas Extension
Bangalore – 560 080
Tel. (080) 361 3585, 361 3457
Fax (080) 361 1584 • E-mail netpro1@vsnl.com

Mr Sudhir Chandra
M/s Chanderpur Works
Yamuna Nagar – 135 001, Haryana
Tel. 01732 250 546, 250 964, 251 866
Fax 01732 279 852
E-mail sudhiryn@sancharnet.in

Mr Naval Kishore Agarwal
Infinite Energy Pvt. Ltd
149-A, Baba House, 1st Floor, Kilokari,
Opp. Maharani Bagh, New Delhi – 110 014
Tel. 011 6527 3819 / 6519 1937
Fax 011 2690 3696
E-mail ifnfinitenergy@vsnl.net
Web www.infiniteenergyindia.com

Shri H R Jaiswal, Managing Director
Rishipooja Energy and Engineering Company
M G College Road, Gorakhpur – 273 001 (UP)
Tel. 0551 340 612, 339 475

Shri K J Haris, Managing Director
Southern Carbons (P) Ltd.
Palackal Buildings, Premier Junction
Kalamassery – 683 104, Cochin, Kerala
Tel. 0484 540 158 (O) 532 685 (F) 532 684®
Fax 0484 532 179
E-mail southerncarbons@indianbest.com

Dr S V Makadia, President
Radhe Renewable Energy Development
Associate, D-110 Rajdoot Industrial Estate
4, Umakant Pandit Udyognagar
Near Mavdi Plot
Rajkot – 360 004 (Gujarat)
Tel. 91 981372567 (O) 571932
Fax 91 281372557
E-mail radheengineering@radhegroup.com

Shri Ashok Mourya
Agro-power Gasification Plant Pvt. Ltd
B37/181, B1, Birdopur, Varanasi – 221 010 (UP)
Tel. 0542 236 4285 • M 9415221537

Mr Navin Raheja, Managing Director
OVN Bio Energy Pvt. Ltd
BT 1/90, Mangolpuri Industrial Area, Phase-1
New Delhi - 110083
Tel. 91 11 2791 1603, 2791 1608
Fax 2791 6379
E-mail gasifier@ovntepl.com

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