



Arrya Hi-Tech Energy

Turnkey Energy Solutions

Licensed by IISc



Presents

**MW level Power plant using
Biomass Gasifier**

By

P. Prabakar

1 MW Biomass Gasification Grid Connected Power Plant

**Arashi Hi Tech Bio Power (P) Ltd,
Sulthanpet, Coimbatore,
Tamilnadu, India**

**Technology Provider
ABETS, IISC
Bangalore**

Plant commissioned on January 2005

Overview of Arashi Hi - Tech Bio-Power (P) Limited

- Single largest IPP based on fixed bed biomass gasification technology from IISc
- First grid-linked Project of 1MW capacity in the country
- Cost of the project was about Rs. 5.0 crore.
- Central Financial Assistance of Rs 1.50 crore sanctioned
- Currently providing direct employment to 40 personnel and over 100 indirectly
- Plant has operated in excess of 40000 hours.
- Project conceived to use coconut shells as feed stock-project located in heartland of coconut breaking.

- To operate at rated conditions-1.0 MW, with in-plant consumption of ~ 12% and a PLF of > 80% depends on grid availability
- Power to be fed to the grid and wheeled to sister concern excess power to be supplied to TNEB
- Recover input cost of fuel through sale of activated Carbon by-product having Iodine no. ~ 500 to 600

Project as implemented

- Project commissioned with five gas engines and two Gasifier on Jan 13th 2005
- Commenced with wood as a feedstock due to Price of coconut shell shot up to Rs.2600/ton from Rs. 1100/ton.
- Operation continued with coconut shell as feed stock after an year
- 100% gas engines from Cummins India introduced for producer gas application
- Technical correction and fine tuning of engine and electrical system operations allowed capacity of 1 .0 MW generation without any difficulties
- Captive consumption at 1 MW level nearly 20 % reduced to around 12% with introduction of Vapour Absorption chilling plant based on engine exhaust and gravity cooling tower
- Introduction of biomass conveying and drying system improved the PLF after an year.

Cumulative Operating Data

Years	Gasifier (A&B) running hrs	Generation in MWH	Biomass consumption in MT	Specific consumption Kg/unit
2005	8428	3070	3567	1.16
2006	14093	5079	5748	1.13
2007	10596	3825	4546	1.19
2008	13883	5016	5515	1.11
2009	8741	3121	3495	1.12

Arashi Hi Tech Bio Power (P) Ltd, Sulthanpet, Coimbatore,



Company profile

Arrya Hi Tech Energy- Turnkey Supply of Gasifiers

With the hands-on experience gained over the past years in biomass Gasifier operation and maintenance the group entered the renewable energy field in a big way.

Arashi entered in to technology transfer agreement with IISc for promoting new Gasifier projects in the name of “**ARRYA HI-TECH ENERGY**” from 2006. It provides for continues upgrading to include all future developments made in the technology by IISc.

Arrya Hi-Tech Energy (AHE) is a turnkey supplier of biomass Gasifier based power plants as well as Gasifier for thermal applications and executed more than 20 large scale projects with in the span of last 6 years.

Beach Minerals company Private Limited Kuttam,

- **Captive power plant for an EOU unit in Tamilnadu**
- **Was using diesel based power generation system**
 - 300,000 to 400,000 kWh per month
 - ~100,000 – 200,000 Its of diesel per month

The intervention

- Biomass gasification based power generation 1.5 MW e using gas engines
- 1.5 MW e using gas engines
- Arrya taking responsibility on the gasification island
- Cummins India Limited on the Power generation system
- IISc was involved in the advisory role providing all the technical design

System configuration

- 2 No's Gasification system of nominal rating 850 kg/hr

- Total system package
 - Water treatment system
 - Fuel processing system

- **Power generation system**
 - 7 engines of each 240 kWe capacity
 - All the engines parallel
 - Captive power generation

- **Fuel used**
Weed - Prosopsis Juliflora

Performance

- ▶ Total engine hours over 1,40,000 hours
- ▶ Total power generation ~ 20 million units
- ▶ Maximum operational hours annually
 - Engine 7275
 - Gasifier 6979
- ▶ Average annual operation ~ 6800 hrs
- ▶ Specific biomass consumption = 1.25 ± 0.1 Kg/kWh

Beach Minerals company Private Limited, Kuttam, Tirunelveli



Particulars	Arashi-1MW –Grid connected plant	BMC-1.5MW – Captive power plant
Plant capacity	2x750Kg/hr	2x850Kg/hr
Peak load, kWe	1200	1680
Average loadk, kWe	1020`	1428
Opeartional hrs in an year	7500	7880
Plant load factor	85%	90%
Specific fuel consumption, kg/kWh	1.1 to 1.2	1.15 to 1.25
Cost of biomass per kWh	3.45 (Coconut Shell)	2.4(Wood)
O & M cost of gasifier, Rs/kWh	0.40	0.35
O & M cost of engine, Rs/kWh	0.25	0.25
Total O & M cost, Rs/kWh	0.65	0.60
Value added services like chilling, drying, steam generation etc, cost/kWh of energy generated	0.15	0.18
Intallation cost, Rs/kWh	50000(1000USD)	42000(840USD)
Fiscal benefits like subsidy, cost/kWh	15000(300USD)	7000(140USD)
Interest cost, Rs/kWh	0.34	0.3
Depreciation benefits, Rs/kWh	0.34	0.39
Total operating cost, Rs/kWh	3.95	2.73
Recovery from chrcoal/Activated carbon Rs/KWh	1.56	0.25
Selling cost or fossil fuel offset cost, Rs/kWh	4	12
Overall profit, Rs/kWh	1.61	9.52

Arrya HiTech Energy

Services

AHE is a one-stop-shop for biomass Gasifier services. In addition to supply of Gasifiers for power and thermal applications AHE can undertake operation and maintenance services at the client's request. AHE can offer assistance in integrating the same into the client's existing infrastructure to derive maximum benefit and energy efficiency. AHE will provide a host of comprehensive support services such as facilitating subsidy sanction and release, assistance in fuel linkage, statutory clearances.

Supply : Gasifier Capacities

- ▶ Power Plant (Captive & Grid) – 50KW – 6 MW +
- ▶ Heating Applications – up to 20 MW

Arrya Core Strength

- Project Implementation Experience within the time and cost schedules
- Hands on experience in operating own 1 MW grid linked Arashi Hi-Tech power plant from 2002
- Professionals with experience of more than 70000 man hrs in Gasifier, 100% producer gas engine and dual fuel engine.
- Experience in executing thermal Gasifier plants for different applications very successfully
- Comprehensive manufacturing facilities with ISO 9000 & 18000
- Largest 6MW power plant experience on installation
- Ability to provide O&M, AMC service to customer
- Completion of Thermal project in 4 months and Power project in 6 months

Projects

Executed Power Plants

- Beach Minerals Company Private Limited, Tirunelveli dist – 1.5 MW (2 X 850 kg/hr Gasifier) – Captive
- Pointec Writing Instruments Private Limited, Hosur – 250 KW (1 X 300 Kg/ Hr Gasifier) – Captive
- Beach Minerals Company Private Limited, Tirunelveli dist – 750 KW (1 X 850 Kg/ Hr Gasifier) – Captive
- Sri Sasthaa Energy Private Limited, Chennai – 600 KW Grid Linked
➤ (1 X 750 Kg/ hr Gasifier) – Grid linked

Executed Thermal Plants: –

- Kandasamy Metal Rolling Mill Private Limited, Kerala. – 300 KW (1 X 100 Kg/ Hr Gasifier) – Aluminium melting
- Beach Minerals Company Private Limited, Tirunelveli – 1200 KW (1 X 400 Kg/ Hr Gasifier) – Mineral drying
- Beach Minerals Company Private Limited, Tuticorin – 600 KW (1 X 200 Kg/ Hr Gasifier) – Mineral drying
- Acclaim Technology Services, Chennai – 1050 KW (1 X 350 Kg/ Hr Gasifier) – Mineral drying
- Amrita Institute of Medical Sciences; Cochin, Kerala – 750 KW (1 X 250 Kg/ Hr Gasifier) – Cooking and Food processing
- ITC Ltd, Vellakovil - 1800 KW (600 Kg/Hr Gasifier) – Biscuit Baking

- Godrej & Boyce Mfg Co Ltd, Shirwal – 1200 KW (400 lit/Hr Gasifier) – Powder Coating & Drying Oven
- Godrej & Boyce Mfg Co Ltd, Mohali – 1200 KW (400 Kg/Hr Gasifier) – Powder Coating & Drying Oven
- Olivellam, Srilanka – 360 KW (120 Kg/Hr Gasifier) – Tea drying
- Karur K.C.P Packaging Ltd, Karur – 100 KW (35 Kg/Hr Gasifier) – Cooking and canteen Application
- Sonali Extrusions, Coimbatore – 2250 KW (750 Kg/ Hr Gasifier) – Aluminium Melting ,Ageing & Pre heating
- Balamurugan Chemical Private Limited, Tuticorin –8000 KW (2 X 1600 Kg/Hr Gasifier) – Titanium dioxide calcination
- KMC Aluminum Industries,Coimbatore–900 kw(300kg/hr Gasifier) – Aluminium Melting

Power Plants Under implementation: –

- TMB, Nepal – 720 KW (1 x 900 Kg/hr Gasifier)
- Cummins Cogen, Sattur, VirudhuNagar Dist., TamilNadu – 1 MW (1 x 1200 Kg/hr Gasifier)
- Perundurai Green Energy , Perundurai, Erode, TamilNadu– 5.7MW (3 x 2000 Kg/hr Gasifier) – Highest capacity in the country
- IISC, Bangalore – 100 kg/hr

Thermal Plants Under implementation: –

- Britannia Industries Limited, Villupuram Dist., TamilNadu 1500 KW (2 x 500 Kg/Hr Gasifier)- Biscuit Baking

Heat & Power Combined : –

- Godrej & Boyce Mfg Co Ltd-Interio Bhagwanpur- 1500 KW (500 Kg/Hr Gasifier)

Contact details:

Arrya Hi-Tech Energy

76, Patel Road,

Ramnagar,

Coimbatore – 641 009

Tamilnadu, India

Ph : 0422 2232897, 4379344, Fax : 2233755

E-mail : info@arrya.net, arrya_cbe@yahoo.co.in

Web : www.arrya.net

Thank you