

## HOW GASIFICATION PLANTS WORK

**GASIFICATION** is a thermo - chemical process, which converts solid carbonaceous material/fuel, waste material in to useful clean gaseous fuel called **PRODUCER GAS**. It is noteworthy that this technology has completed almost a century of a proven use all over the world.

This technology has been approved by all the organizations of the world, like **UNO, UNDP, DOE USA, FAO, MNES of GOI** and the concerned government agencies of every nation. Many under- developed and developing countries have declared incentives to encourage this form of renewable & cleaner technology for energy generation.

World wide there are different types of gasifier working according to end use.

- Up draft Gasifier : Mainly for small & medium thermal application.
- Down draft Gasifier : Mainly for small power generation.
- Fluidized bed Gasifier : for more than 10MWth thermal application & big power plant.

Mainly we are working with Up draft Gasifier which is suitable for small & medium thermal application.

Up draft Gasification technology is robust and ideal for adaptation of different types of fuel and not sensitive to different feed stock and also quality of fuel.

following reaction take place in Up draft Gasifier.

- Combustion  $C + O_2 = CO_2 + \text{heat}$
- Water gas  $C + H_2O = CO + H_2 - \text{heat}$
- Water shift reaction  $CO + H_2O = CO_2 + H_2 + \text{heat}$
- Boudouard reaction  $C + CO_2 = 2 CO - \text{heat}$
- Methane reaction  $C + 2 H_2 = CH_4 + \text{heat}$

After producing the producer gas, the gas send for further treatment depending on end use. Our R&D department design different types of valves, ducting and burners according to application.

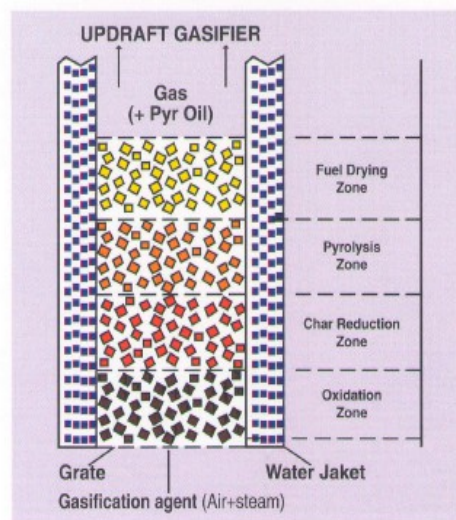
### UPDRAFT GASIFIER

This is very efficient and universally accepted design

specially for thermal application. It replaces liquid fuel in equipments like, kiln, dryer, boiler, furnace etc. & accepts variety of solid fuel like, steam coal, wood, charcoal, bio-coal (briquette) etc.

### GASIFICATION PROCESS

Different zones inside the reactor (Gasifier) are clearly shown in the below diagram;



### CHEMICAL COMPOSITION OF PRODUCER GAS (Approx)

The Gasifier can convert any type of Bio-mass/coal into Producer Gas. The chemical composition of Producer Gas is as under; (The gas composition may slightly differ depending upon the fuels.)

- CO (Carbon Monoxide) : 20 ± 2% (App.)
- CH4 (Methane) : 03 ± 1% (App.)
- H2 (Hydrogen) : 18 ± 2% (App.)
- CO2 (Carbon Dioxide) : 06 ± 3% (App.)
- N2 (Nitrogen) : 50 ± 5% (App.)
- Condensable heavy hydro carbon (Tar) : Depends on fuels.
- C. V. of Producer Gas : 1000 to 1300 K.Cal/NM<sup>3</sup>







## The Gasification technology has wide range of application essentially in

**PRODUCER GAS** the main product of gasified carbonaceous material, a cleaner & gaseous fuel, can replace existing fossil fuels like **kerosene, Furnace oil, diesel, LPG, LDO, CNG** etc. in number of applications. These can be divided into two main categories (Thermal).

### DIRECT HEAT/IN-DIRECT HEAT APPLICATIONS

In this application PRODUCER GAS is burnt directly in Furnaces, Kilns, Boiler, Spray Dryer with the help of suitable producer gas burner to replace any type of existing liquid fuel.

### APPLICATIONS OF DIRECT HEAT/IN-DIRECT HEAT

The Gasification technology has wide range of applications, notably in;

- **Ceramic Biscuit Kiln**
- **Ceramic Glaze Kiln**
- **Ceramic Roller Kiln for**
  - Luster tiles
  - Granito tiles
  - Porcelino tiles
  - Vitrifies tiles
- **Billet Pre-heating Kilns**
- **Forgings Pre-heating Furnace**
- **Aluminum/Brass Melting Furnace**
- **Calcination Kiln - Rotary Kiln**
- **Hot Air Generator (Direct/In-direct)**
- **Spray Dryer**
- **Incinerator**
- **Continuous Lime Kilns (VSK)**
- **Refractory Tunnel Kiln**
- **Annealing Kilns**
- **Boiler**
- **Various types of Dryers, Ovens & Furnaces**
- **Iron ore Kiln**

- **Cement Kiln**
- **Continuous Heat Treatment Kiln**
- **Sodium Silicate Furnace**
- **Glass Kiln**

### APPLICABLE INDUSTRIES

- Ceramics Industries
- Hot Re-Rolling Mills
- Refractory & Minerals Industries
- Forgings Industries
- Cement & Lime Industries
- Chemicals Industries
- Food Processing Unit
- Metal Industries
- Rubber Industries
- Pharmaceuticals
- Textile Proces. Unit
- Paper & Pulp Ind

### APPLICABLE SOLID FUELS & CONSUMPTION RATIO (Approx)

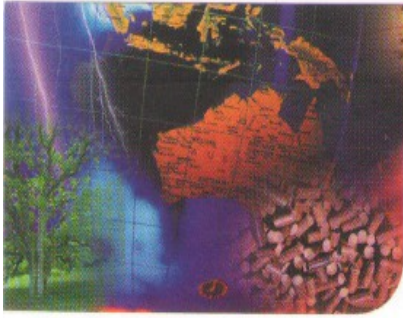
- Steam Coal B Grade : 2-2.50 Kg/Ltr. Liq. Fuels
- Steam Coal C & D Grade : 2.5-3 Kg/Ltr. Liq. Fuels
- Steam Coal - Imported : 1.75-2 Kg/Ltr. Liq. Fuels
- Bio-coal / Briquette : 3-3.5 Kg/Ltr. Liq. Fuels
- Wood Coal/Charcoal : 1.5-1.75Kg/Ltr. Liq. Fuels
- Wood : 3.5-4 Kg/Ltr. Liq. Fuels
- Lignite : 3-4 Kg/Ltr. Liq. Fuels

### APPLICABLE SOLID FUEL DATA

- Solid Fuel Size : > 10 mm
- Moisture content : < 15 %
- Ash content : Up-to 30%







## FEATURES & ADVANTAGES

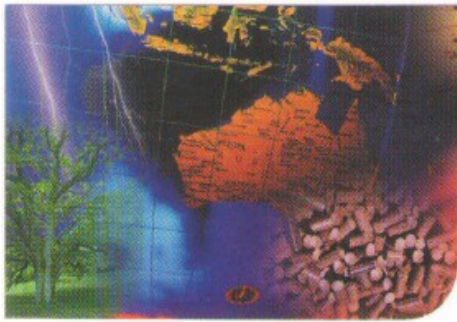
### ADVANTAGES OF BIO-MASS GASIFIER

The Bio-mass Gasifier system is capable for gasifying several types of solid fuel such as Wood, Biomass Briquettes, Charcoal, Imported Steam coal at high efficiency. In addition, the emission control system of toxic gases such as sulfur dioxide and oxides of nitrogen in this technology is easy to operate, inexpensive, and efficient.

- **Low Nox formation due to low flame temperature.**
- **Negligible SO<sub>x</sub> formation Due to bio-mass as a feed Stock.**
- **After combustion of producer gas ash and smoke emissions are very negligible compare to solid and liquid fuel combustion.**
- **Worldwide environment friendly accepted renewable technology.**
- **Does not harmful to environment**
- **Acceptability of range of carbonous material.**
- **Facility to switch over the online fuel change.**
- **Auto ash removal system.**
- **No emission of air from the Gasifier.**
- **User friendly operation of gasifier and robust construction.**
- **Low temperature & pressure during operation.**
- **Replaces fossil fuel & reduce oil import bill.**
- **Generate employment .**
- **Payback period 6-8 months.**
- **Stable operation to maintain stability in end process.**
- **High standard safety precaution facilities and automization.**
- **Emergency Shut down facilities.**







## PRODUCT RANGE (SPECTRUM OF PRODUCT)

UP-DRAFT GASIFIER SYSTEM MODEL CHART

Sr. No.	Model	Thermal Output K Cal / Hr.	Fuel Moisture 15%	Heat value K. Cal / Hr.	Size of Fuel MM	Fuel Consumption Kg. / Hr.	Lq. Fuel Repla. Ltrs. / Hr.	Application
1	RREDA-900	7,74,000	Steam Coal-B Grade Steam Coal-C&D Grade Steam Coal Imported Bio-coal / Briquettes Wood Coal / Charcoal Wood Lignite	5000 4000 5500-6000 4000 6500 3000 3500	15 - 75	100 - 185 120 - 225 80 - 150 140 - 260 70 - 130 160 - 300 160 - 300	40 - 75	FURNACES KILNS DRYER
2	RREDA-1500	12,90,000	Steam Coal-B Grade Steam Coal-C&D Grade Steam Coal Imported Bio-coal / Briquettes Wood Coal / Charcoal Wood Lignite	5000 4000 5500-6000 4000 6500 3000 3500	15 - 75	185 - 325 225 - 390 150 - 260 260 - 450 130 - 230 300 - 520 300 - 520	75 - 130	FURNACES KILNS DRYER
3	RREDA-2000	17,20,000	Steam Coal-B Grade Steam Coal-C&D Grade Steam Coal Imported Bio-coal / Briquettes Wood Coal / Charcoal Wood Lignite	5000 4000 5500-6000 4000 6500 3000 3500	15 - 75	250 - 435 300 - 525 200 - 350 350 - 610 175 - 300 400 - 700 400 - 700	100 - 175	FURNACES KILNS DRYER
4	RREDA-2500	21,50,000	Steam Coal-B Grade Steam Coal-C&D Grade Steam Coal Imported Bio-coal / Briquettes Wood Coal / Charcoal Wood Lignite	5000 4000 5500-6000 4000 6500 3000 3500	15 - 75	310 - 540 375 - 650 250 - 430 440 - 750 220 - 375 500 - 860 500 - 860	125 - 215	FURNACES KILNS DRYER
5	RREDA-3000	25,80,000	Steam Coal-B Grade Steam Coal-C&D Grade Steam Coal Imported Bio-coal / Briquettes Wood Coal / Charcoal Wood Lignite	5000 4000 5500-6000 4000 6500 3000 3500	15 - 75	375 - 650 450 - 780 300 - 520 525 - 910 260 - 455 600 - 1040 600 - 1040	150 - 260	FURNACES KILNS DRYER
6	RREDA-4000	34,40,000	Steam Coal-B Grade Steam Coal-C&D Grade Steam Coal Imported Bio-coal / Briquettes Wood Coal / Charcoal Wood Lignite	5000 4000 5500-6000 4000 6500 3000 3500	15 - 75	435 - 810 525 - 975 350 - 650 610 - 1140 300 - 570 700 - 1300 700 - 1300	175 - 325	FURNACES KILNS DRYER
7	RREDA-5000	43,00,000	Steam Coal-B Grade Steam Coal-C&D Grade Steam Coal Imported Bio-coal / Briquettes Wood Coal / Charcoal Wood Lignite	5000 4000 5500-6000 4000 6500 3000 3500	15 - 75	500 - 1075 600 - 1290 400 - 860 700 - 1500 350 - 750 800 - 1720 800 - 1720	200 - 430	FURNACES KILNS DRYER
8	RREDA-6000	51,60,000	Steam Coal-B Grade Steam Coal-C&D Grade Steam Coal Imported Bio-coal / Briquettes Wood Coal / Charcoal Wood Lignite	5000 4000 5500-6000 4000 6500 3000 3500	15 - 75	750 - 1250 900 - 1500 600 - 1000 1075 - 1750 525 - 875 1200 - 2000 1200 - 2000	300 - 500	FURNACES KILNS DRYER
9	RREDA-7000	60,20,000	Steam Coal-B Grade Steam Coal-C&D Grade Steam Coal Imported Bio-coal / Briquettes Wood Coal / Charcoal Wood Lignite	5000 4000 5500-6000 4000 6500 3000 3500	15 - 75	1000 - 1500 1200 - 1800 800 - 1200 1400 - 2100 700 - 1050 1600 - 2400 1600 - 2400	400 - 600	FURNACES KILNS DRYER

