dCarbon Neutral 25kWe 50kWth

Talbott's Biomass Generators

BG25 Information Pack

www.germanpowergenerators.com

25kW Electric
50kW Thermal

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Owning the BG25

The introduction of the BG25 combined heat and power generator to the market place represents a major affordable breakthrough in carbon neutral power generation.
Off the shelf, automotive components are used in the engine to give high reliability and ease of servicing, the design is simple to understand and the unit is simple to operate, i.e.

- **Totally automatic for 24/7 operation.**
- **Easy to use control system, remotely accessible,**
- **Auto-feed fuel system with weekly refuelling.**
- **25kWe electrical output to export for sale to the grid or save on power costs and use internally.**
- **50kWt heat available to replace fossil fuel heating**
- **Income supplemented by green incentive feed in tariffs for heat and power**
- **Carbon Trust interest free loans available.**
- **Carbon neutral saving 166t CO_2/annum.**
- **Easy install and servicing.**
- **Finance programmes available.**
- **Simple on site conversion of biomass to energy.**
- **Typical users - large houses, hotels, farm, industrial units, waste re-processors, wood working industry.**
- **Power production can be planned.**
- **Small scale distributed power low impact on environmental cost of biomass movements and where own grown big advantages to the environment.**

Introduction.

The BG25 is a biomass powered Combined Heat and Power (CHP) Generator giving 25 kWe of carbon neutral electrical power and 50kWt of carbon neutral heat. Its revolutionary design concept utilises a novel adaptation of automotive components in the generation system combined with over 30 years of combustion technology experience to convert the energy released by the combustion of the biomass fuel into thermal and electrical power.

It releases the solar energy 'entrapped' within the fuel as well as CO2 which is released in any case when the plant degrades naturally which when growing the plant had absorbed via the photosynthesis process. This environmentally conscious CHP generator is easy to operate with a fully automated control system which can be monitored and controlled remotely. It's designed to be used at maximum continuous power without manpower input except for refuelling and particular attention has been paid to ensure this occurs reliably giving the owner a good return on his investment.

How it works

Biomass is burnt in a controlled manner in a stepped moving grate combustor and the combustion gases are passed into an air-to-air heat exchanger (HEX). A series of baffles within the HEX's 'cassettes' directs the gas flow across stainless steel pipes the inside of which is compressed air from the compressor stage of the turbocharger.

The combustion gases still have some heat once they've passed through the HEX and this residual energy is extracted as hot water by passing the gases through a boiler. The gases are drawn through the system by an induction fan to atmosphere.

On exiting the heat exchanger, the now hot clean compressed air is directed into the turbine side of the turbocharger where it partially expands to drive the compressor impellor which is drawing in fresh ambient air via a filter. It is then directed to the power turbine which drives the synchronous alternator via a reduction gearbox. To recover its residual energy the air is now directed to the combustor to complete the process.

Specifications

Power Outputs	25kWe to local specification e.g. 3 phase 415v 50Hz. 50kWt as hot water 60^{o}C in 80^{o}C out at 45l/min
Operation	Fully automatic computer controlled for 24/7 operation. Remote monitoring as standard.
Fuel	Multiple choice e.g. wood chips or pellets
Fuel Size	To EU G50 standard
Fuel Bunker	25 m^{3} with auto-feed
Combustor	Moving stepped grate. Refractory fire brick construction.
Heat Exchanger	Heavy duty high temperature stainless steel
Engine	Talbott's compound series radial turbine system
Generator	Synchronous 35kVA. Complies with local standards
Size	2 x 3.5 x 3m excluding bunker

Installation requirements

The preferred installation is inside a well ventilated enclosed building or its own boiler house. Providing the direct weather is kept off the system it can be outside e.g. under a Dutch barn provided extreme temperatures aren't present.

Base. A flat level concrete base is required capable of supporting 7t udl over an area of 2 x 3.5m with the base itself being 3 x 4.5m min in size.

Electrical connection. The BG25's maximum electrical power output is 35kva 3 phase. The voltage and frequency is optional to match the customer's local grid standards e.g. 415v at 50Htz. The connection itself should be through an approved import / export meter via a fused isolator with wiring that meets local standards and is installed by a suitably qualified person.

It is possible for the system to operate in a stand alone situation. A small 5kWe generator is required for start up and because all the power produced has to be absorbed an electric power bank and a thermal hot water dissipater must be installed.

Water System. As with the electrical connection, plumbing is beyond Talbotts source of supply and must be designed and installed by suitably qualified persons. The system should be designed to accept a heat absorption flow rate of 60^{o}C in; 80^{o}C out at a flow rate of 45l/min and a maximum pressure of 3 bar. If the heat isn't required it must be absorbed and dissipated to atmosphere with a 75kWt minimum dissipater to ensure peak loads are handled.

Bunker position. The bunker can be positioned to meet site needs with the following provisos –

a) It can be inline with or at right angles to the combustor feed auger.

b) The maximum auger length from the bunker to the rotary valve is 10m.

c) The maximum slope of the bunker auger is +/- 10^{o}.

Fuel Size Woodchip size distribution to Ecological Standard M 7133

	% by weight of relevant chip size (mm)				Extreme Values (mm)	
	20% max	60 – 100%	20% max	4% max	Cross section	Length
G 50	>31.5	31.5 – 5.6	5.6 – 1.0	<1.0	50	120

There are four requirements for fuel –

(1) Size: it must conform to the EU G50 standard above.

(2) It mustn't pollute the atmosphere when combusted.

For UK applications where demolition wood is concerned, painted and pressure treated preservative wood must be separated at source and not burned.

(3) When burnt, the combustion gasses mustn't be corrosive.

This that can of concern with fuels such as wheat straw in that dependent upon the fertilizer regime used chlorine gases can be detrimental to the air-to-air heat exchanger and shorten its life. Fuel sample analysis will indicate if this is likely when if it is the case, lime can be added to the fuel to neutralise the effects.

(4) The ash content must be below 1% with minimal fly-ash.

Because of the above the only fuel currently approved for use in the BG25 is wood chip at less than 25% moisture content. Other fuels may be used subject to analysis and our approval.

Ash Wood chip ash makes a good fertilizer and can be spread on soil for disposal.

Uses

The BG25 has multiple uses and will produce power when needed rather than being weather dependent. In use it can be used in distributed power and heating systems, replace diesel electrical generators, but primarily to substantially reduce power usage costs.

Typical applications are where biomass is supplied as fuel large house, hotels and farms the wood working and other industries such as waste re-cycling where the fuel would otherwise go to landfill.

CO2 Saving

Biomass which absorbs atmospheric CO_2 via the photosynthesis process, is solar energy stored in fibrous material. When the plant degrades it breaks down and releases CO_2 to the atmosphere as it does if it's burnt which is why its carbon neutral. To calculate the carbon saving -

For each kW of electricity generated by UK fossil fuel fired power stations 0.45kg of carbon dioxide is produced. Therefore:-

25kWe x 8000hrs/year x 0.45kg/kWh = 90t/year

The equivalent emissions from a gas-fired boiler are calculated based upon 1kW of heat generated by a gas-fired boiler 0.19kg of carbon dioxide is produced. Therefore:-

50kWth x 8000hrs/year x 0.19kg/kWh = 76t/year

In total 166 tonnes of CO2 emissions will be displaced each year for every BG25 installation.

Servicing

The heat exchanger is cleaned monthly with a quarterly oil and filter change. A major service is required after 30,000hrs.