



# 100 kW Biomass Generator

## Presentation

Biomass Generator...



ELECTRICITY



HOT WATER

...Harnessing the Power of Nature



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**BIOMASS GENERATORS**

*Biomass Generator...*



*...Harnessing the Power of Nature*

**BIOMASS GENERATOR**  
**100 kW<sub>e</sub> 200 kW<sub>th</sub>**







## THE BIOMASS GENERATOR

Ten years of research and development have been completed to produce this small-scale biomass fuelled combined heat and power unit. The system utilises well-proven technology incorporating clean hot air for turbine operation with special features and a unique combustion process.

The Biomass Generator (BG100) is a highly efficient technology capable of producing 100kW of renewable electricity and 200kW of renewable heat. The system is run on biomass which can be considered as solar energy stored in the chemical bonds of trees and plants, making it a renewable and sustainable source of energy.

The BG100 is capable of utilising a wide range of biomass fuels; these include forestry and agricultural residues, wood chips, wood pellets and energy crops such as coppiced willow, grown as a short rotation crop, and Miscanthus (elephant grass).

The size makes the BG100 ideal for installation on farms, large estates, woodworking factories and anywhere that there is a readily available supply of fuel. This technology will lead to added value for crops and will offer an effective end use for energy crops. It will also provide an opportunity to the agricultural community for a much needed, viable diversification option.

A significant return can be received from the sale of the energy produced. This includes revenue from the sale of the electricity, including Renewables Obligation Certificates (ROCs) due to the renewable nature of biomass energy, and sale of the heat energy. The heat produced can be used to provide heating and hot water for surrounding buildings or can be sold to increase the Biomass Generator's income.

Due to the system being factory made, on-site installation is kept to a minimum; installation of the BG100 is therefore a relatively quick and simple procedure.

The 100kW of renewable electricity and the 200kW of renewable heat produced by the system will lead to a carbon dioxide emission reduction of around 600 tonnes per unit each year; this is compared to emissions from fossil fuel fired heat and electricity production. This is a significant saving which will greatly benefit the environment by reducing the release of carbon dioxide, a greenhouse gas, into the atmosphere.

The BG100 is a small, compact system designed for on-site power production. Transport of fuel is minimised through the utilisation of on-site or local fuel sources, achieving further emission reductions directly related to the use of this system.

## TALBOTT'S BACKGROUND

*Stafford based Talbott's is the UK's leading manufacturer of biomass energy systems. A world leader in the ongoing development of biomass energy technology, the company has over 3,500 working installations as far a field as the USA, Canada, Europe, Asia, Russia and Australia.*

*Established 30 years ago by Bob Talbott, who was prompted to produce his first wood-fired boiler after the oil crisis and three day week of the mid-70s; the company is still very much a family concern today.*





## BIOMASS GENERATOR FEATURES

100kW electrical energy for sale to the grid or for own use.

200kW thermal energy can provide a continuous source of heat for a wide variety of applications such as large farmhouses, hotels, country estates or commercial properties.

Containerised in two standard shipping containers.

Easy to use controls – despite the sophisticated level of programming that is possible, making Talbott's Biomass Generator so flexible, the controls are easy to understand and operate.

Computer controlled combustion – ensures that the system is fed with the right amount of fuel to maintain the required energy output.

Remote monitoring of controls and notification of alarms is possible.

**BG100**



**BUNKER**



Flexible fuel loading – bunker fuel storage systems for ease of loading by a variety of methods, additional storage capacity and silos available on request.

Robust, variable fuel mechanism – allows varying sized specified biomass to be fed into the boiler.

Triple pass ceramic lined high temperature combustion zone – helps to maximise efficiency and, because Talbott's achieve such a steady, high combustion temperature, it is possible to use fuels with a higher moisture content than would otherwise have been possible.

High combustion temperatures ensure clean combustion, meeting all environmental standards.

Step grate system with auto de-asher – ensures even burn throughout combustion chamber for improved efficiency.

**COMBUSTOR**



**BIOMASS TURBINE GENERATOR**



The indirect fired micro turbine is an integral part of the BG100.

High speed direct drive engine coupled to power electronics to provide high levels of engine efficiency and remove the need for a reduction gear box and the losses associated with it.

## TECHNICAL SPECIFICATION

### Plant Specifications

Electrical Power Output (rated)	80 to 100kW
Generating Voltage/Frequency	415V / 3 Phase / 50Hz
Grid Protection	Software G59 Compliant
Fuel Type	Biomass
Thermal Output	150 to 200kW
Heat Output Format	Hot Water up to 90°C
Operation	Fully Automated Continuous Output

### Electrical Efficiency

Electrical efficiency is anticipated to be over 20%; 2-3 times greater than steam based systems at this size.

### Fuel Specification

Fuel must be biomass with a moisture content of up to 40%; an increase in moisture content will give an increase in fuel consumption. The particle size of the fuel can be anything up to 30mm<sup>3</sup>.

### Emissions

The Biomass Generator is compliant with Environmental Protection Act regulations, under the Clean Air Act. Very low emissions levels are achieved without the use of flue gas scrubbing equipment for uncontaminated biomass fuels; this results in minimal combustion equipment maintenance.

### Operational Availability

The BG100 can be operational for approximately 8000 hours per annum.



Talbott's manufacture a wide range of biomass and waste to energy combustion systems producing warm air, hot water, steam, electricity or any combination of these.

Agents Stamp:







Manufacturers of Biomass & Waste to Energy Systems

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### **Talbott's Biomass Generator**

As a brief introduction, we are the UK's leading manufacturers of **Biomass Energy Equipment**, being established for over 30 years with more than 3,500 working installations world-wide.

We have a broad product range available to utilise waste or biomass as a fuel to produce:  
**HOT AIR - HOT WATER - STEAM - ELECTRICITY.**

***All our units have exemption under the Clean Air Act and comply with EPA Regulations due to their low emission outputs.***

Biomass can be considered as Solar Energy stored in the chemical bonds of trees and plants. Biomass is a carbon neutral fuel as the majority of the fuel used is grown especially for the purpose of producing energy; therefore the same amount of carbon is taken up by the plant during growth as is released during combustion, resulting in no net gain of carbon dioxide in the atmosphere. If forestry and agricultural wastes are left to decompose naturally they will release the same amount of carbon into the atmosphere as when they are used to fuel one of our units.

The Biomass Generator (BG100) is a highly efficient technology capable of producing 100kW of renewable electricity and 200kW of renewable heat. Fuels that can be used in this unit include wood chips, forestry and agricultural residues, short rotation coppice, such as willow, and energy crops, such as Miscanthus. The BG100 converts this biomass, through combustion, into energy in the form of electricity and heat. The Biomass Generator will be officially launched later this year and one of the first units will be installed at Harper Adams University College, an agricultural college in Shropshire.

It is envisaged that the majority of these units will be installed on farms, large estates or anywhere that there is a readily available fuel supply to provide on site energy production. This will offer an effective end use for energy crops and also much needed diversification opportunities with the sale of electricity back to the grid.

BG100 installations will lead to added value for crops and an income through the sale of the electricity; this will include revenue from Renewables Obligation Certificates (ROCs). The heat produced can be used to provide heating and hot water for surrounding buildings or can be sold increasing the Biomass Generator's income. Assuming 8000 operating hours per year, the sale of the electrical and thermal energy produced by the Biomass Generator can provide a return of up to £80,000 depending on current prices for energy and ROCs.

As the Biomass Generator is a carbon neutral technology, the use of this unit will bring about significant carbon emission savings relating to the production of energy. The BG100 produces 80 to 100kW of renewable electricity and around 200kW of renewable heat, the unit will be operational for approximately 8000 hours per year; carbon emission savings for this size of unit, compared to fossil fuel fired energy production, are calculated overleaf.

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Manufacturers of Biomass & Waste to Energy Systems

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

Therefore:  $100\text{kWe} \times 8000\text{hrs/year} \times 0.45\text{kg/kWh} = 360\text{t/year}$

The equivalent emissions from a gas-fired boiler can be calculated thus.

For each kW of heat generated by a gas-fired boiler 0.19kg of carbon dioxide is produced.

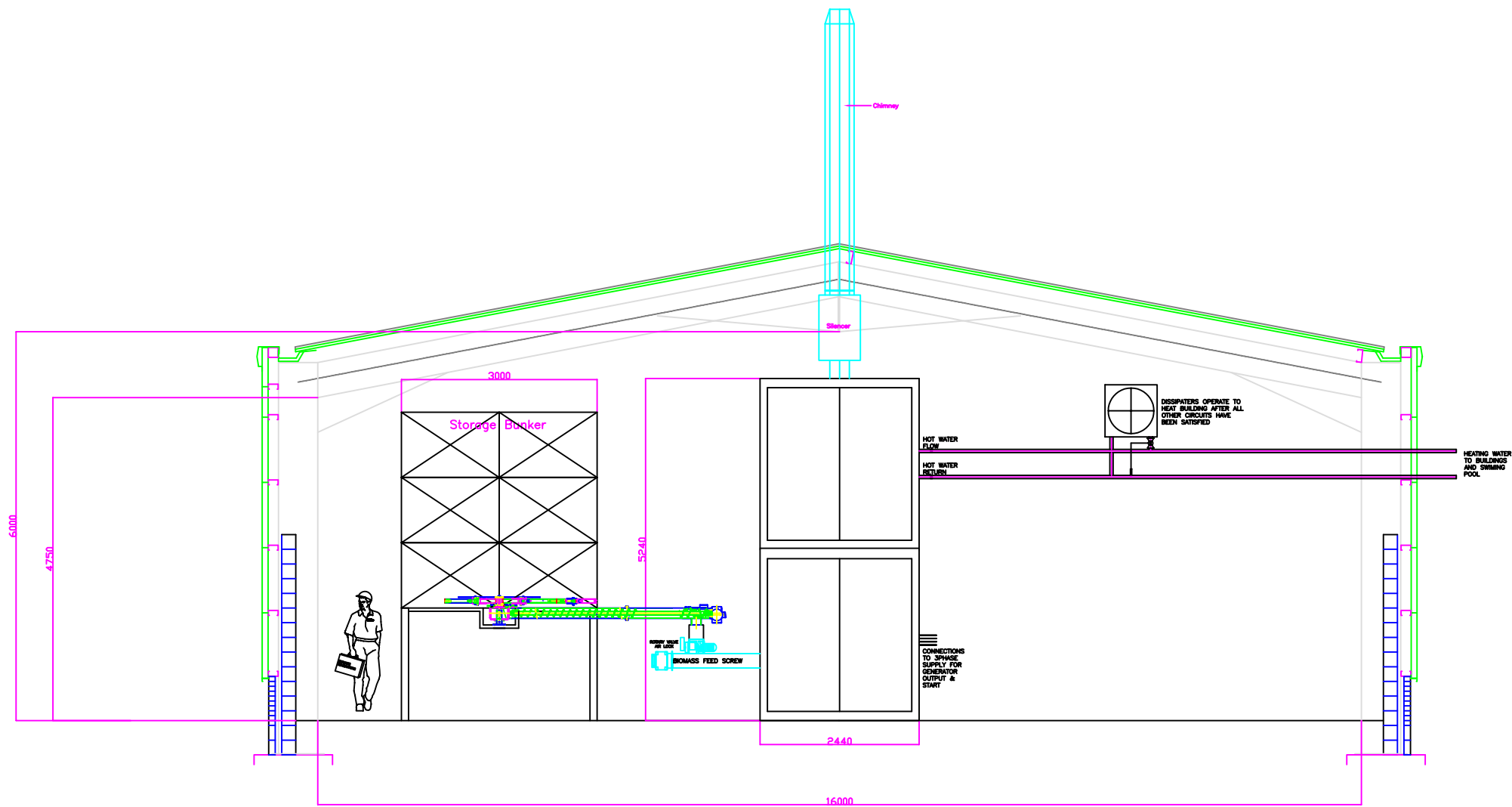
Therefore:  $150\text{kWth} \times 8000\text{hrs/year} \times 0.19\text{kg/kWh} = 228\text{t/year}$

In total 588 tonnes of CO<sub>2</sub> emissions will be displaced each year for every BG100. This is a significant saving, which will greatly benefit the environment by reducing the release of carbon dioxide, a greenhouse gas, into the atmosphere.

The BG100 system has been developed to provide a competitively priced source of electrical power from wood fuel, which presents a low level of technology risk. Using the latest power plant technology, a product has been specifically developed for the renewable energy and waste to energy market.

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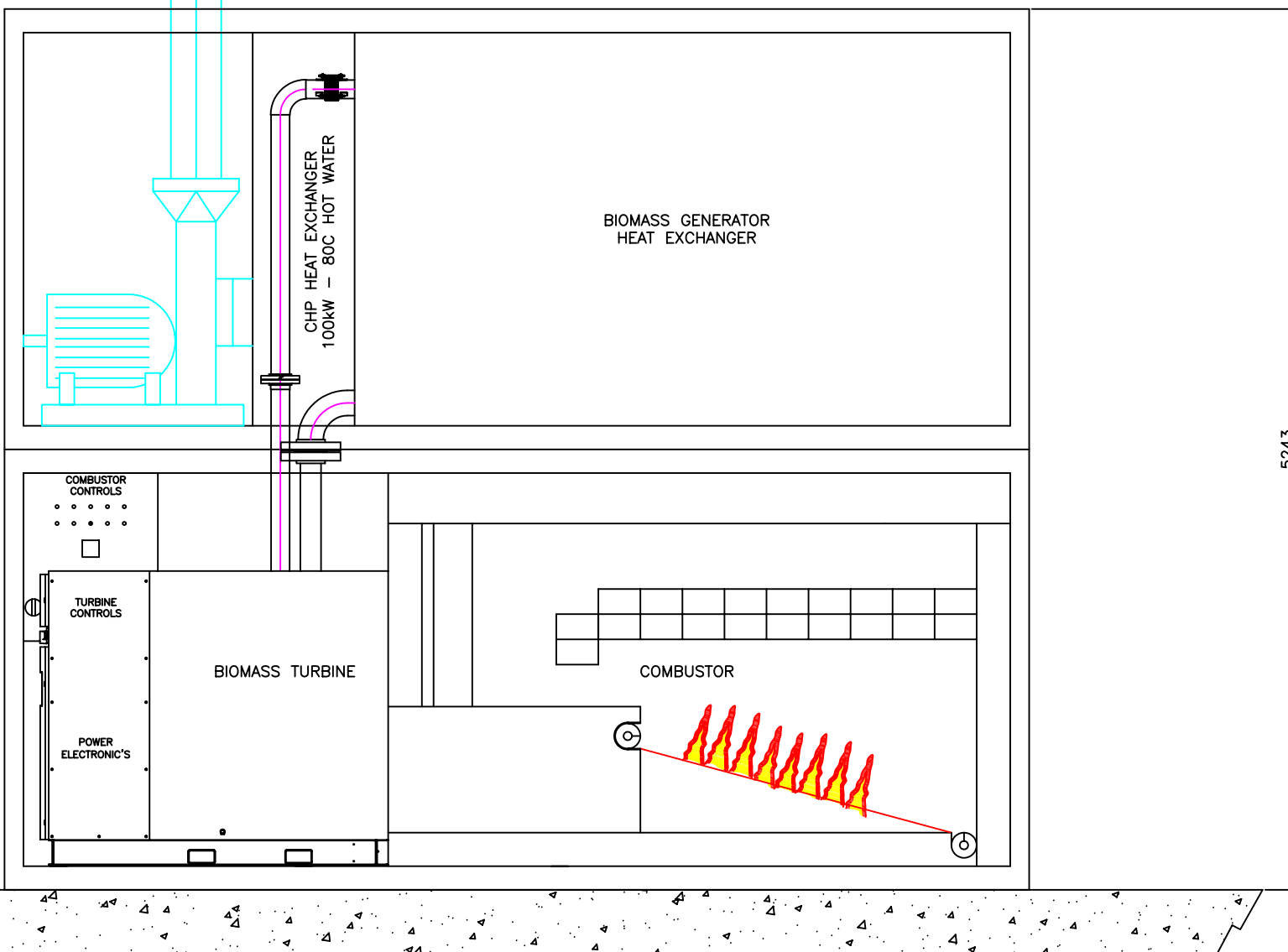


## BG100 Site Elevation

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Client: ?	
Drawing Title: Site Elevation	
Quote No:	Drawing No:
Scale: NTS	Drawn By: DLP
Revision:	Date: 7/4/2004

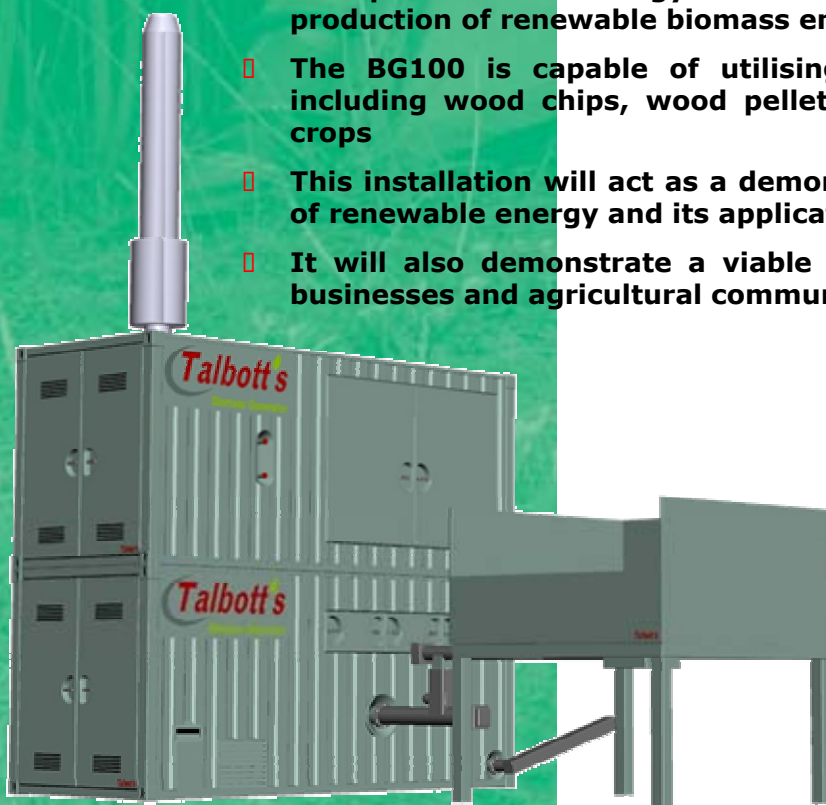


## Case Study: Harper Adams University College

- Harper Adams University College, a leading agricultural university in Shropshire, have installed a Talbott's Biomass Generator
- The Biomass Generator (BG100) combined heat and power system will provide the university with 100kW of renewable electricity and 200kW of renewable heat



- This patented technology will allow the efficient, reliable and viable production of renewable biomass energy on site
- The BG100 is capable of utilising a wide range of biomass fuels, including wood chips, wood pellets, agricultural residues and energy crops
- This installation will act as a demonstration unit to increase awareness of renewable energy and its applications
- It will also demonstrate a viable diversification opportunity for farm businesses and agricultural communities







100kW Electricity  
200kW Thermal

**Biomass Generator.**

**Harnessing the power of nature**



**Talbott's**  
Biomass Generators

Biomass & waste to energy solutions

# The Biomass Generator

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willow, grown as a short rotation crop, and Miscanthus (elephant grass).

The size makes the BG100 ideal for installation on farms, large estates, woodworking factories and anywhere where there is a readily available source of fuel. This technology will lead to added value for crops and will offer an effective end use for energy crops. It will also provide an opportunity to the agricultural community for a much needed, viable diversification option.

Due to the system being factory made, on-site installation is kept to a minimum; installation of the BG100 is therefore a relatively quick and simple procedure.

## Renewable energy income opportunity

A significant return can be received from the sale of the energy produced. This includes revenue from the sale of the electricity, including Renewables Obligation Certificates (ROCs) due to the renewable nature of biomass energy and sale of the heat energy. The heat produced can be used to

provide heating and hot water for surrounding buildings or can be sold to increase the Biomass Generator's income.

The 100kW of renewable electricity and the 200kW of renewable heat produced by the system will lead to a carbon dioxide emission reduction of around 600 tonnes per unit each year; this is compared to emissions from fossil fuel fired heat and electricity production. This is a significant saving which will greatly benefit the environment by reducing the release of carbon dioxide, a greenhouse gas, into the atmosphere.

The BG100 is a small, compact system designed for on-site power production. Transport of fuel is minimised through the utilisation of on-site or local fuel sources, achieving further emission reductions directly related to the use of this system.



Harper Adams University College  
- location of a BG100 installation.

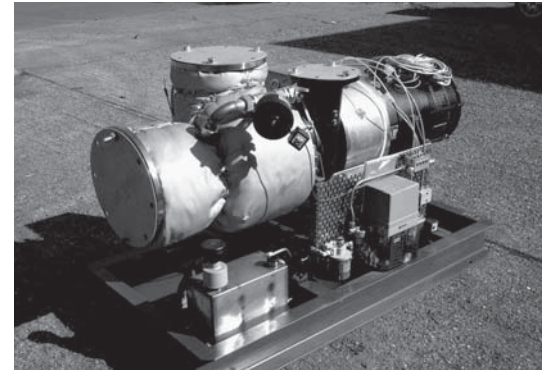


Processed biomass fuel ready to be  
fed into a biomass energy system.



Stafford based Talbot's is the UK's leading manufacturer of biomass energy systems. A world leader in the ongoing development of biomass energy technology, the company has over 4,000 working installations as far a field as the USA, Canada, Europe, Asia, Russia and Australia.

Established 30 years ago by Bob Talbot, who was prompted to produce his first wood-fired boiler after the oil crisis and three day week of the mid-70s; the company is still very much a family concern today.



Biomass Turbine Generator



Combustor

## BIOMASS GENERATOR FEATURES

### Energy outputs

- **100kW electrical energy for sale to the grid or for own use.**
- **200kW thermal energy can provide a continuous source of heat for a wide variety of applications such as large farmhouses, hotels, country estates or commercial properties.**
- **Containerised in two standard shipping containers.**

### Easy to use controls

Despite the sophisticated level of programming that is possible, making Talbott's Biomass Generator so flexible, the controls are easy to understand and operate. Computer controlled combustion – ensures that the system is fed with the right amount of fuel to maintain the required energy output. Remote monitoring of controls and notification of alarms is possible.

### High temperature combustor for maximum efficiency

A triple pass ceramic lined high temperature combustion zone - helps to maximise efficiency and because Talbott's achieve such a steady, high combustion temperature, it is possible to use fuels with a higher moisture content than would otherwise have been possible.

High combustion temperatures ensure clean combustion, meeting all environmental standards. Step grate system with auto de-asher – ensures even burn throughout combustion chamber for improved efficiency.

### Flexible fuel loading

Bunker fuel storage systems for ease of loading by a variety of methods, additional storage capacity and silos available on request. Robust, variable fuel mechanism – allows varying sized specified biomass to be fed into the boiler.

### Highly efficient biomass turbine generator

The indirect fired micro turbine is an integral part of the BG100. High speed direct drive engine coupled to power electronics to provide high levels of engine efficiency and remove the need for a reduction gear box and the losses associated with it.



BG100 showing 'Bunker'.



## TECHNICAL SPECIFICATION

### Plant Specifications

<b>Electrical Power Output (rated)</b>	80 to 100kW
<b>Generating Voltage/Frequency</b>	415V / 3 Phase / 50Hz
<b>Grid Protection</b>	Software G59 Compliant
<b>Fuel Type</b>	Biomass
<b>Thermal Output</b>	200 to 250kW
<b>Heat Output Format</b>	Hot Water up to 90°C
<b>Operation</b>	Fully Automated Continuous Output

### Efficiency

Electrical efficiency is over 20%; 2-3 times greater than steam based systems at this size. Overall efficiency exceeds 80%.

### Fuel Specification

Fuel must be biomass with a recommended moisture content of less than 25% but can be up to 40%. An increase in moisture content will give an increase in fuel consumption. The particle size of the fuel can be anything up to 30mm<sup>3</sup>.

### Emissions

The Biomass Generator is compliant with Environmental Protection Act regulations, under the Clean Air Act. Very low emissions levels are achieved without the use of flue gas scrubbing equipment for uncontaminated biomass fuels; this results in minimal combustion equipment maintenance.

### Operational Availability

The BG100 can be operational for approximately 8000 hours per annum.



Talbott's manufacture a wide range of biomass and waste to energy combustion systems producing warm air, hot water, steam, electricity or any combination of these.

### AGENTS STAMP



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