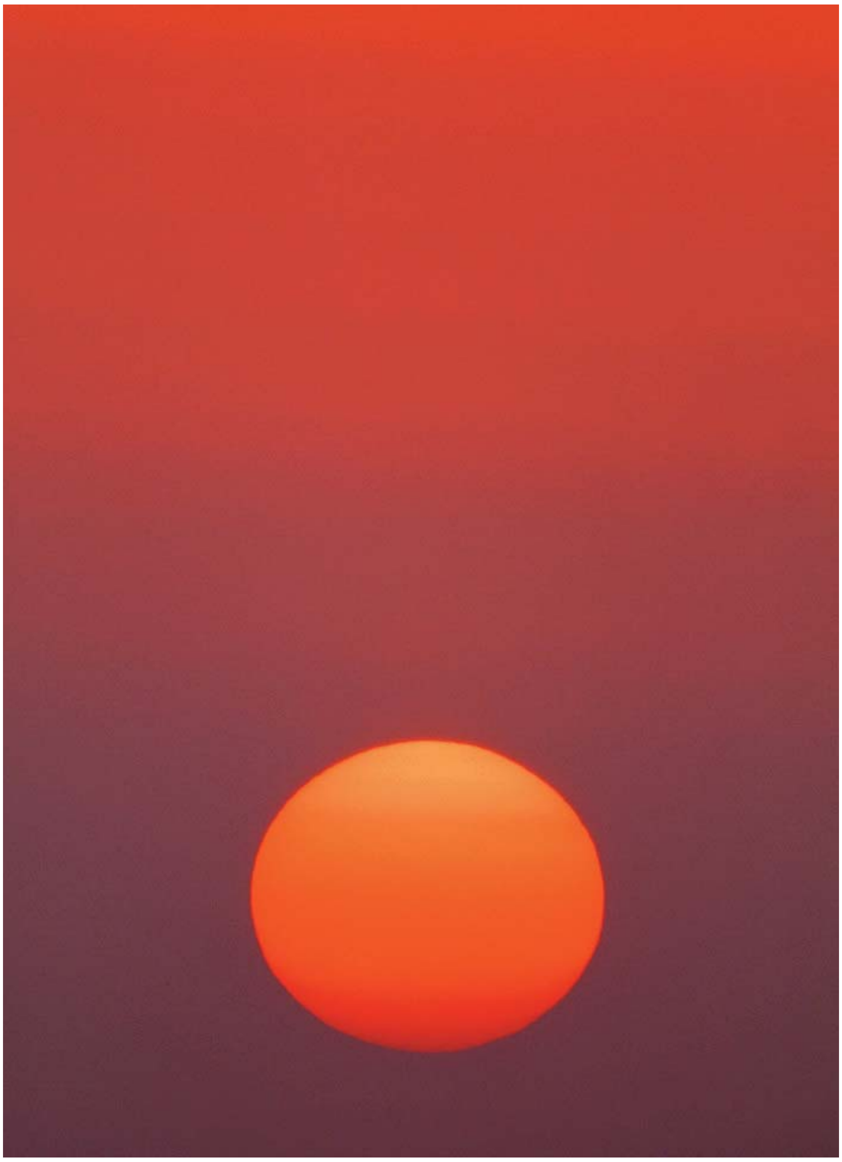
CLEAN PYROLYSIS

Energy from waste and biomass

Power can be derived from heat in many different ways. Heat travels in many forms. Flames are the most visible form of heat production but heat can be found where flames do not exist. Pyrolysis is the use of heat to break down biomass into its constituent gaseous components in the absence of combustion.

The pyrolysis technology offered by Organics involves the use of heat in the complete absence of air. Without air combustion is not possible. The resultant reactions are therefore clean and complete, leading to a maximisation of power production in the form of Volatile Organic Carbons. These are the re-formed biomass constituent components now present as a gas.

With the complete absence of air, toxic products of partial combustion, such as dioxins and furans, cannot be formed.



KEY FEATURES

PYROLYSIS OF BIOMASS USING CLEAN HEAT

NO COMBUSTION OR FLAMES INVOLVED

LOW EMISSIONS RESULTING FROM THE ABSENCE OF AIR DURING THERMAL DEGRADATION

DRYING IN THE ABSENCE OF AIR MAXIMISES VOCs

COMPACT AND EFFICIENT

LOW RUNNING COSTS

LONG-LIFE CYCLE BETWEEN OVERHAULS

EXTREMELY COST EFFECTIVE FOR SMALL AND LARGE-SCALE WASTE DISPOSAL

CAN BE USED WITH HAZARDOUS WASTE AND CLINICAL WASTE

QMS ISO 9001 REGISTERED FIRM

PROJECT ROUTE

WASTE STREAM QUANTIFICATION AND CHARACTERISATION

DESK STUDY TO EVALUATE POTENTIAL FOR ELECTRICITY GENERATION

FIELD DATA COLLECTION TO DETERMINE FACTORS THAT WILL IMPACT UPON VIABILITY

FATAL FLAW ANALYSIS

DECIDE UPON CAPACITY

SYSTEM DESIGN INCLUDING WASTE PROCESSING, GAS TREATMENT (IF REQUIRED), ENGINE LOCATIONS AND ELECTRICAL CONNECTION

PROCURE COMPONENT PARTS OF THE PROJECT

CONSTRUCTION AND COMMISSIONING

OPERATION AND MAINTENANCE

PRE-REQUISITES

The utilisation of biomass for the production of electricity has long been an established commercial activity. The days of uncertainty have long since passed.

It remains a necessity, however, to fully characterise waste streams involved, whether it be forestry residues or municipal solid waste. Of paramount importance when considering a biomass project employing thermal technology is the moisture content of the waste. It is also essential to understand the waste production patterns over a full one-year cycle and the impact of seasonal changes to waste types and moisture content.

This kind of data is normally available from records but verification of such records is also a prerequisite, especially in countries where records serve multiple purposes.

Once it has been established that the waste stream in question offers the possibility of a viable utilisation project the revenue streams that can be generated from the waste need to be quantified. Electricity prices vary significantly from country to country. Incentives and grants may also be available for specific types of renewable energy production.

With this data it will now be possible to assemble a rudimentary financial picture of the proposed project from which ballpark returns may be assessed.

DESK STUDIES

A good desk study will establish very clearly the scale of the opportunity involved.

Other factors, such as the location of the waste stream, its proximity to a grid connection or point of use, site access and all locality-specific factors must be fully researched and understood. Many such elements in a project scenario may make a significant difference to the overall project viability.

If, for example, the site is located many miles from a grid connection, it will be necessary to allow for a connection. Should it not be possible to put in overhead electric cables the cost may become disproportionate to the value of the revenue stream involved. The extent and cost of all such facets of the proposed project must be assessed before the project progresses to implementation.

A desk study would feed relevant information into a detailed model. The model, analysing the overall structure of the project in physical, chemical and financial terms is a key tool in determining the capacity of a given prospect.

With a good desk study it is possible to establish to a high degree of accuracy the potential for biomass utilisation. Further project establishment activities would then be aimed at confirming this position, rather than discovering new information.

FIELD DATA COLLECTION

Much can be learned from an on-the-ground study of a project location. Aspects such as the best route for power lines and ground conditions are important in deciding not only feasibility but also the optimum use of technology.

WASTE CLASSIFICATION

A waste classification trial is an activity that should only be omitted where there is certainty about the nature of the biomass waste stream involved. In the case of municipal solid waste, the variations that can be encountered from one location to another within a country, or even a large city, are surprisingly large. As the waste stream is actually the fuel it is essential that it is as well understood as any other fuel source.

A waste classification trial will ensure that no unexpected conditions are encountered further into the project. There is nothing worse for a developer than to discover that the waste profile envisaged by the desk study was actually incorrect.

As mentioned previously, the moisture content of a specific waste type is critical to engineering design. Where this factor was omitted in some of the early projects undertaken in this field, the result was disastrous for overall project performance. Biomass to energy projects should not be seen as a good source of revenue for the legal profession.

CAPACITY DETERMINATION

This is an important decision gate for any project. There is a temptation to consider that a biomass supply is not variable. However, it is clear that any investment should be made to work to the maximum that is available, without taking undue risks.

A power generation facility may be sized to take the full duty out of an anticipated biomass source, or it may be set up to play safe and avoid risk.

Being able to produce the maximum commercial return from a given situation requires a thorough understanding of the parameters involved and the realistic options that are available.

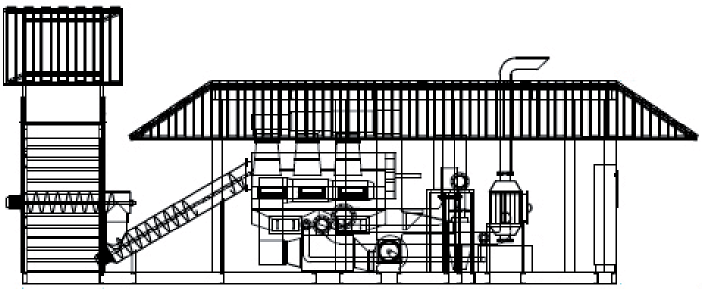
A base-load investment, where peaks are not taken by the energy production system, may be preferable to one where a higher annual percentage redundant capacity is acceptable.

SYSTEM DESIGN

As an understanding of the market and the needs of its customers has developed, so the main engine suppliers have progressively improved the quality of the fit between their product and market demand.

There are, therefore, no hard and fast rules about how a new system should be designed. Advantage should be taken of every commercial opportunity available.

Being at the forefront of this technological development has allowed Organics to offer the most appropriate solutions based upon the latest developments.



KEY FEATURES

PROVEN EXPERIENCE IN BIOMASS INDUSTRIES FOR OVER 15 YEARS

EQUIPMENT PROVIDING MORE THAN 90% AVAILABILITY FOR COMPLETE FACILITIES AND 95% FOR GAS PUMPING AND PROCESSING EQUIPMENT

TURNKEY DESIGN, MANUFACTURE AND INSTALLATION SERVICES AVAILABLE OR COMPONENT SUPPLY ONLY

FINANCE AVAILABLE THROUGH AFFILIATED COMPANIES

OPERATION AND MAINTENANCE SERVICES PROVIDED

A ONE STOP SOLUTION FOR A COMPLETE SERVICE RELATING TO THE EXPLOITATION OF BIOMASS AS A COMMERCIAL RESOURCE

DATA SHEET ODSR06

SPECIFICATION DATA

Mass flow rates available
3.6 to 240 tonnes per day.
Modules used to increase daily capacity

Power configuration
Steam-cycle for inhomgeneous biomass streams and difficult wastes

Direct-combustion in spark-ignition engines for "clean" biomass

System configuration
- Waste reception and feed
- Drier
- Pyrolyser
- Thermal oxidiser for steam cycle
- Boiler and steam turbine
- Gas clean-up for pyrogas engine cycle
- Gas engine or gas turbine

Energy conversion
Biomass varies in calorific value from 6 MJ/kg to approximately 18 MJ/kg, subject to type;
The steam cycle efficiency is approximately 25% when used with a stirling engine and 18% when used with a steam turbine;
The pyrogas cycle with an internal-combustion engine has an overall efficiency of approximately 30%.

Land requirements
A 3.6 tonne per day unit will fit into a 40 ft container;
A 240 tonne per day unit will require a building 100m x 75m.

BIOMASS APPLICATION

The overall objective of the biomass application is to convert biomass materials, such as waste wood products, woodchips, forestry residues, short rotation coppice, miscanthus and other energy crops and agricultural wastes such as bagasse, coconut husks, waste from palm oil plantations, and organic sludges (sewage and animal slurries), into renewable power (as electricity) and heat. The Clean Pyrolysis system will do this in a highly efficient and environmentally sound manner and, in so doing, will displace a significant fossil fuel requirement.

Using local biomass as a source of fuel for CHP applications provides a sustainable source of energy and is carbon neutral in terms of the recycling of CO2 emissions through the natural biomass growth cycle.

The Organics Clean Pyrolysis Biomass System is designed to meet this objective.

WASTE APPLICATION

The use of mixed municipal solid waste as a feedstock introduces issues of pyrogas consistency which can best be addressed by use of a steam cycle for power production. Whilst this will have a lower efficiency, it is, however, a very robust technological approach which is tolerant to contaminated/dirty material feedstocks.

Pyrolysis gases that are given off during materials conversion can be controlled, captured and used for ethanol and methane production or cleaned to provide useful recoverable energy sources for up-stream heating systems and drying processes.

SPECIAL APPLICATIONS

As well as a method of disposal for municipal solid waste with power generation and power generation from biomass, the Clean Pyrolysis system has several other potentially highly valuable applications. Operating at suitable temperatures, the system can be employed for clinical waste disposal, together with power generation. Similarly, many industrial wastes, such as scrapped vehicle fragment waste, used tyres, other mixed metaliferous and organic scrap such as electrical cable and automotive components, are currently sent to landfill sites for disposal when they could be converted and added value into commodities for resale, co-firing fuel-products or simply pyrolysed to effect a dramatic weight and volume reduction.

THE CLEAN PYROLYSIS SYSTEM

The technology offered by Organics has many and varied applications in final waste disposal and energy production from organic waste and biomass feed-stocks. The nature of the heat employed in a completely oxygen free atmosphere ensures an efficient and low emission conversion to carbon char and pyrogas, each with its own potential application. In high-energy recovery situations the carbon char may be further gasified to maximise energy take off.

Please refer to Data Sheets ODSR07 and ODSR08 for details on the K Range, for mass flows up to 24 tonnes per day, and the MT Range for mass flows up to 240 tonnes per day.

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