



# AgriPower

INCORPORATED

## CONVERTING BIOMASS WASTE INTO CLEAN AND AFFORDABLE ENERGY

### THE AGRIPower WASTE-TO-ENERGY, COMBINED HEAT AND POWER SOLUTION.

AgriPower, Inc. ("**AgriPower**") has developed a unique electric power and heat generation technology (the "**Technology**"). The Technology is contained in modular, mobile and transportable "Biomass" (described below) fuelled, Waste-to-Energy ("**W2E**"), Combined Heat and Power ("**CHP**"), mini turbine, electrical power generation systems (the "**Systems**"). The Systems utilize a proprietary, technically superior, high temperature, clean air design and include a robust, fully automated, PC-based operating software module that permits constant remote monitoring via telephone, satellite or the Internet. The Systems are built around well-established combustion chamber and gas turbine technologies that reliably generate electricity and clean hot air that is available for "Co-Generation" (described below). The Systems generate from 200kW/hr to 600kW/hr of on-site electricity and from 2MMBTU/hr to 60MMBTU/hr of hot air suitable for heating buildings, or producing hot water, air conditioning and/or refrigeration.

The Systems were specifically designed to be fuelled by a wide variety of abundant, renewable and virtually free or low cost wood, cardboard, paper, agricultural and animal waste materials including manure (i.e., "**Biomass**") and many types of plastic waste. They are affordable, inexpensive to operate, environmentally friendly, highly efficient, prefabricated, modular, easily transported to on-grid and off-grid remote locations and designed to operate continuously (i.e., 24/7) with minimal operator input. Additional benefits of are that they use low air pressure and are non-condensing (i.e., they do not use water or steam in their operation) and are usually exempt from local permitting requirements.

Generators of usable waste streams, such as commercial and industrial enterprises and farmers and ranchers can utilize their own Biomass and plastic waste as a free or low cost fuel, offsetting the expense of purchasing electricity, diesel fuel and natural gas, to generate their own electricity and heat. The Systems were designed to be installed and operated at the Biomass generation site, thereby eliminating fuel transport costs. In doing so, the Biomass can be used productively rather than being burned in the open air or decomposing in a woodpile or in the field where it converts to methane gas. Methane gas is more than 21 times more harmful to the environment than carbon dioxide.

Depending on the composition, density and moisture content of the fuel, the 300kW/hr System will combust between 15,000 and 30,000 pounds (10 to 15 tons) of fuel for each 24 hours of continuous use. Less suitable Biomass, such as lettuce leaves, paper and other low BTU materials, can be mixed with denser materials such as wood chips, and cardboard and thereby used as fuel.

### TYPES OF FUEL AND TYPICAL CUSTOMERS.

The System can be configured to use most types of Biomass and many other materials as fuel, including:

- **Commercial and Industrial Waste** including wood, wood chips, pellets and sawdust (from lumber mills and construction sites); wooden pallets and other wood waste; cardboard; paper; discarded fruits and vegetables; and many types of plastic (from "Big Box" stores, supermarkets, malls and shopping centers, food processors, greenhouses, casinos, hotels, hospitals, prisons, jails, colleges, paper and pulp mills and municipal waste and landfill operators).

- **Agricultural Waste** including most types of crop waste such as sugar cane bagasse; almond, coconut, nutmeg, peanut, coffee bean and walnut shells; olive and peach pits; corn stover (from farmers); nuisance plant materials such as invader bush; beetle infected trees; rapidly growing renewable fuel crops including jatropha, hybrid poplars and willows and switchgrass; forest residuals including bark; and most other types of agricultural and animal waste materials including many types of manure (from poultry producers, dairy farmers, ranchers, cattle feed lot operators and horse farms). The availability and low cost of these fuels are of special interest to **Governmental and Non-Governmental Organizations** for use at their remote and off-grid populations, military bases, disaster sites, etc.

- **Municipal and Utility Waste** including tree waste and brush (from municipal landfills, highway department and utility tree trimming and gardening activities) for use in schools, hospitals, libraries and other municipal buildings.

### **TYPES OF ON-GRID APPLICATIONS.**

Typical on-grid applications include:

- **Producers of Biomass and plastic waste** that can now use it as a low cost or virtually free fuel instead of having to pay high disposal fees and taxes to have it brought to a landfill.
- **Reducing the expense of purchasing** electricity, natural gas and expensive diesel fuel where there is an abundance of virtually free or low cost Biomass readily available for use as fuel.
- **Generators of usable waste streams** that are subject to increasingly restrictive environmental regulations that prohibit or penalize their transport of Biomass waste to a landfill or no longer allow the waste to be burned in the open air or to decompose and convert into harmful methane gas.

Most of AgriPower's customers plan on using the electricity and heat produced by their Systems in their own operations (i.e., "behind the fence") as their primary source of power and heat, significantly reducing their electricity and natural gas bills, and some even plan to sell their excess electricity to the local public utility.

### **REMOTE, OFF-GRID APPLICATIONS.**

The Systems, which are modular and transportable, can be configured to provide a distributed power solution at remote (off-grid) locations where there is no or limited electricity or where electricity is "available" but it is expensive or unreliable. They can be used in place of or to complement more expensive alternative energy technologies such as wind and solar that cannot produce electricity on a 24/7 basis. When the electric grid is not available, the System has to be linked to a substitute load-regulating mechanism.

### **SIGNIFICANT FUEL, POWER AND HEAT SAVINGS.**

The Systems are designed to compete against purchased electricity, natural gas and diesel fuel oil. AgriPower provides energy producing and waste disposal solutions for generators of, or entities that have access to, waste materials that can be used as a virtually free or low cost fuel in an AgriPower System.

In contrast with readily available and virtually free or low cost Biomass, diesel fuel oil is particularly expensive to obtain, transport and store, dirty to burn and its availability and price can be uncertain. Although a System sells for more than a comparably sized diesel generator, the cost difference will be made up in significant fuel savings and Co-Generation benefits in three to four years of operation (before tax benefits). In most of the remote locations where diesel generators are used, the cost of diesel fuel oil today is between \$5 and \$8 (or more) per gallon. Accordingly, at today's fuel prices, the return on investment for the purchaser of a 300kW/hr AgriPower System that replaces a comparably sized diesel generator is about two and one-half years. A purchaser that selects a larger AgriPower System (they range in size up to 600kW/hr) will enjoy even greater fuel savings. **In comparison to a comparably sized diesel generator, a 300kW/hr System is expected to generate approximately \$10 to \$15 million in fuel savings over its useful life of 20 years** depending on the price of diesel fuel oil.

Similarly, an on-grid commercial or industrial operation that uses its Biomass and plastic waste as fuel (e.g., broken wooden pallets, cardboard, paper, and discarded fruits and vegetables) in an AgriPower System will usually achieve savings in electricity and natural gas purchases, and disposal costs, that pay for it in about three years.

In addition to their fuel, electricity and disposal savings, AgriPower's customers receive additional economic value from the System's "**Co-Generation**" that results from the very clean, hot air and/or hot water that is produced in addition to the electricity. Attaching a "**Co-Gen Converter**" to a System can add valuable applications such as desalinating and purifying water; making ice; producing refrigeration, air conditioning, heat and hot water for buildings; and industrial heating and drying processes such as heat bonding and drying various products such as paint and wood.

AgriPower's Systems may also qualify for significant tax benefits (e.g., investment tax credits, grants, carbon credits and renewable energy certificates) and other environmental subsidies.

### **PROVEN TECHNOLOGIES; RELIABILITY.**

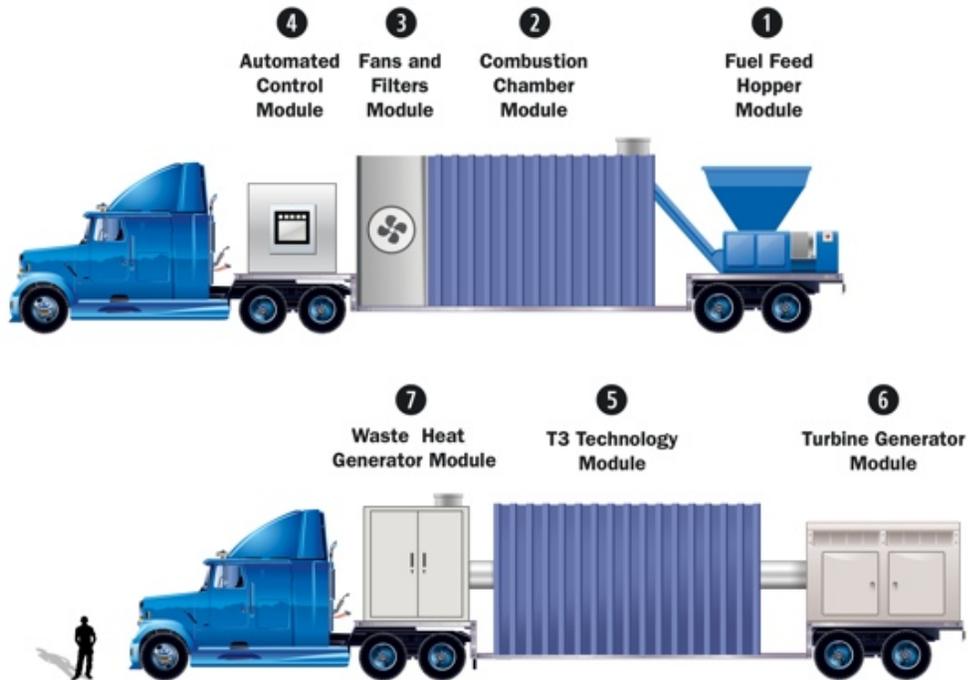
AgriPower's first generation System was an 80kW/hr proof of concept test unit. It was operated at an Oregon lumber mill using wood chips as fuel. A test program was conducted over a one-year period in a wide range of operating conditions. Additional testing of gas flows and heat transfer dynamics was conducted at Solar Turbine, Inc.'s Research and Development facility in San Diego, California over a period of several months (Solar is a wholly owned subsidiary of Caterpillar, Inc., a manufacturer of mini turbines). The results of the testing program confirmed the 80kW/hr System's basic design concept and overall performance. It is from this initial test program that a second-generation 250kW/hr System evolved. Based on its initial test results, a design improvement program was developed and implemented and a test program of the 250kW/hr System using Biomass as fuel was conducted over a several year

period. Proof of concept having been established, AgriPower currently offers Systems with net outputs of 200kW/hr, 300kW/hr, 400kW/hr, 500kW/hr and 600kW/hr and plans to introduce a 1MW/hr System in early 2012.

**EASE OF TRANSPORT; RAPID ASSEMBLY AND INSTALLATION; FLEXIBILITY OF OPERATION.**

Each System component and module is skid mounted and contains quick connect fittings. This enables them to be placed on the chassis of a tractor-trailer and easily brought to where they are needed, kept on and operated from the tractor-trailers, quickly placed into service, utilized for as long as necessary (typically, until all of the wood waste is used as fuel) and then easily re-deployed to other sites. For example, the Systems can be brought to disaster sites and used to dispose of the enormous amounts of waste wood from damaged houses and trees. This avoids overwhelming the local landfills with otherwise usable wood waste and provides, for emergency use, electricity and Co-Generation that can be used for heating purposes and to purify and heat water and make ice on-site.

**AGRIPOWER’S MODULAR, TRANSPORTABLE SYSTEM**



The above illustration shows the complete AG-300 System which consists of: (1) the Fuel Feed Hopper Module; (2) the Combustion Chamber Module; (3) the Fans and Filters Module; and (4) the Automated Control Module, all set on a tractor-trailer chassis. A second trailer chassis contains: (5) AgriPower’s proprietary T3 Technology Module (it stands for Thermal Treatment and Transfer); (6) the 225kWh Turbine Generator Module; and (7) the 125kWh Waste Heat Generator. The Systems provide flexibility as they can be operated on tractor-trailers or “permanently” installed (they can always be easily dismantled and re-located). If the System will be permanently installed, all that is necessary is a cement or gravel laydown pad for it to be placed on. The installation, set-up and tear-down time is only 1 to 2 days. **Modularity, ease of transport and rapid set-up time are significant benefits of the System.**

**PRODUCT BENEFITS.**

The Systems provide numerous significant economic and other benefits to AgriPower’s customers:

- **ABILITY TO USE VIRTUALLY FREE / LOW COST FUEL:** The Systems can be configured to use a wide variety of biomass waste and many types of plastic as fuel.
- **COMBINED HEAT AND POWER TECHNOLOGY:** The unique design of the System enables a portion of the perfectly clean heat generated from its operation to be reused to provide virtually free heat and/or hot water to buildings thereby increasing the System’s economic benefits. Customers (such as hotels, hospitals and prisons) can also obtain an oversized combustion chamber to provide their facilities with additional heat and/or hot water and thereby reduce the amount of natural gas they purchase for these purposes.
- **CO-GENERATION BENEFITS:** Using Co-Gen Converters, the clean hot air automatically produced by the System is available as an additional and free energy source to operate desalination and water purification equipment, ice machines and refrigeration and air conditioning units; to provide heat for industrial heating and drying processes such as heat bonding and for drying paint and wood.

- **SIGNIFICANT FUEL COST SAVINGS:** Use of Biomass and plastic waste for fuel produces dramatic fuel cost savings compared to using diesel fuel oil. Fuel savings from AgriPower's 300kW/hr System will usually provide a financial payback period of between two and three years for an on-grid application (and even less time with the larger Systems). Fuel savings for an off-grid location using diesel fuel oil are estimated to be \$10 to \$15 million over a System's useful life of 20 years compared to a comparably sized diesel generator set.

- **ENVIRONMENTALLY FRIENDLY; QUIET OPERATION:** The System is environmentally friendly and will comply with applicable U.S. and EU permitting and zoning requirements when used with most types of Biomass as fuel. Even contaminated materials (e.g., certain construction and demolition materials) may be used for fuel after adding a mini-scrubber that will capture the contaminants (e.g., paint) after the combustion process. The System is extremely quiet; at 5' its noise level is less than a telephone's dial tone.

- **EASE OF TRANSPORT; REDUCED FUEL TRANSPORT COSTS; RAPID ASSEMBLY; HIGH OUTPUT:** The Systems are prefabricated, modular, skid mounted and can be shipped in standard 20' or 40' shipping containers, making them easily transportable to where the fuel is located, even in highly remote areas (thereby reducing or eliminating fuel transport costs). The Systems contain quick connect fittings so they can be installed and commissioned with minimal on site construction requirements. They produce high electrical and heat output for their size and weight. When all of the modules are assembled, a 300kW/hr System measures about 12' in height, 25' in width and 40' in length and weighs about 80,000 pounds (40 tons). The fuel preparation and storage area, which will vary depending on each customer's needs, could require an additional 20' x 40' area.

- **EASE OF USE; FULLY AUTOMATED OPERATION:** The System has been designed to be easily and safely used in less developed countries by unskilled labor and is extremely user friendly. It is fully automated and was designed to operate continuously (i.e., 24/7) without the need for on-site operating personnel and can be remotely monitored by AgriPower or the customer via telephone, satellite or the Internet.

- **PROVEN TECHNOLOGIES; RELIABILITY; LOW OPERATING COSTS:** The System relies on proven combustion and gas turbine technologies that have been in use for more than 40 years. The reliability of these proven technologies translates into low operating and periodic maintenance costs and extremely low downtime periods.

- **HIGH EFFICIENCY:** The System is extremely efficient and provides about two BTU's of energy (electricity and Co-Generation) for every three BTU's of fuel used through its use of Combined Heat and Power technology.

- **TECHNICAL SUPERIORITY:** Comparably sized Biomass-fueled systems that utilize water, steam, gasification or high air pressure technologies are inferior to AgriPower's unique Technology. Steam systems usually require difficult and expensive to obtain ultra-pure water to operate and may require around the clock engineers to assure the safety of high-pressure vessels and to prevent corrosion. AgriPower's Systems do not use any water, steam or high air pressure to operate (although an optional boiler or steam module may be added for heating and hot water purposes). In gasification systems, turbine blades become coated with pollutants, resulting in expensive and continuing maintenance and downtime problems. The turbine blades in AgriPower's Systems are not touched or damaged by the contaminants of combustion. Diesel generators require the purchase, transport and storage of highly polluting and increasingly expensive and unreliable diesel fuel oil. AgriPower's Systems only need Biomass waste as fuel.

## **SUMMARY AND CONCLUSION.**

AgriPower provides a Biomass-powered, reliable, affordable, environmentally friendly and transportable mini turbine electricity and heat producing Technology for numerous on-grid and off-grid applications. AgriPower's various sized Systems supply a much needed Waste-to-Energy, Combined Heat and Power solution by making it possible to use various types of Biomass and many types of plastic waste as a low cost or virtually free fuel to generate inexpensive electricity and valuable clean hot air suitable for many Co-Generation applications. The Systems are especially attractive to those customers that pay to dispose of their Biomass waste, that pay high costs for electricity or heat or that use diesel generator sets. AgriPower's Systems typically pay for themselves in two to three years.

Interested parties, including prospective customers, independent sales representatives, distributors and dealers, are invited to visit AgriPower's web site to obtain additional information: [www.agripower.com](http://www.agripower.com). Visits to AgriPower's facility and demonstrations of the System in operation can also be arranged.

## **FOR FURTHER INFORMATION, PLEASE CONTACT:**

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