



“Maximize the value of your waste stream and improve the environment! Gasification is an economic, ecological and ergonomic way of handling manure, litter and organic waste into green energy and high value EcoChar.”

MAVITEC GASIFICATION SYSTEMS

Make revenue out of your manure and improve the environment

MAVITEC
Environmental



MAVITEC ENVIRONMENTAL introduces an energy-based environmental solution called gasification. A complete solution to transfer multiple organic/manure streams into green energy and high value EcoChar. The resulting clean heat can be used for many usable energy forms. The biggest benefit of gasification is volume reduction. The left-over of this process is called EcoChar, a high valuable nutrient soil improver with significant economic and environmental value.



REDUCE CO₂, SAVE THE PLANET

Gasification is a new way of solving manure issues and offers:

- Volume reduction up to 85%
- Valuable EcoChar
- Renewable energy
- Reduction CO₂

MAVITEC GROUP

Mavitec Environmental is part of the Mavitec Group, a Dutch company providing solutions for businesses with large quantities of animal by-products, biomass and other fuel sources. Mavitec is specialized in high quality recycling processes and is an expert in building, coordination and delivery of individual components up to complete turnkey projects. Mavitec is based in The Netherlands with sales and service offices worldwide.

ENVIRONMENTAL SOLUTIONS

Together with our partner EarthCare we offer complete solutions to gasify organic streams into a number of usable energy forms through the use of readily available technologies. We aim to integrate gasification technology into agriculture and industry through conversion of available organic by-products.

POWERFUL COMBINATION

Mavitec and EarthCare are a powerful combination. The turnkey solutions we bring to our customers are complimentary and help provide a more complete solution to many of the issues facing (agricultural) companies throughout the world. EarthCare has developed a patented gasification technology, using the knowledge gained through forty years of gasification experience.

MODERN MANURE PROBLEM

Animal manure has become the modern pollution problem. Until now there was no real cost-effective way to either use the surplus of manure/litter or biosolids productively or dispose of it. While government regulation and better manure and/or litter management practices can make a difference, animal manure is and will continue to be an issue. This also applies to a large amounts of biosolids. For this issue Mavitec offers a new solution.

GASIFICATION IS THE ANSWER

A new way of solving the manure problem is gasification: the best economic, ecological, ergonomic way of handling your manure, litter and organic waste challenges. Mavitec Environmental offers a complete

Turn manure, litter and organic waste into green energy



solution to gasify organic streams into an energy source suitable for many applications, such as steam, electricity, hot water and hot air. Besides the energy source a high quality biochar - called EcoChar - is produced. The high value EcoChar has many unique features.

FUELS TO GASIFY

It is possible to gasify a wide variety of fuels. The most feasible fuels to gasify have a high output of syngas combined with a high quality output of EcoChar:

- Poultry litter/manure
- Cattle manure
- Porcine manure
- Sludge
- Biosolids

The formulated EcoChar is dry, pathogen-free, can be more easily stored and transported and has a very interesting commercial value. Based on the characteristics of the fuel being gasified, EcoChar is available in variable qualities and quantities.

ADVANTAGES OF GASIFICATION

- Solves litter/manure/organic waste and litter/sludge challenges
- Reduces volumes up to 85%
- Reduces CO₂ emissions to improve carbon footprint
- Handles up to 55 tonnes of litter/manure per single unit per day (20-30% moisture)
- Generates 5.5 - 6.1 MWth @ 1000°C as hot air flow
- High energy content of the hot air can be used for various purposes
- Possibility of high capacity steam generation (7.7 tonnes steam @ 10 bar)
- Possibility of electricity generation (up to 1.1 MW)
- Produces 350 - 600 kg/hr high quality EcoChar as end product





GASIFICATION is a chemical reaction caused by heating material. Besides heat, the gasifier produces EcoChar, a high quality and valuable by-product. The gasification process ensures a smaller environmental carbon footprint and will be one of the answers to our future energy needs.

Gasification is a chemical reaction caused by heating material in an oxygen-starved environment, resulting in incomplete combustion that drives off carbon-rich gasses. These gasses are then combusted in a thermal oxidizer with the addition of air. The main component of our gasification solution is a down-draft fixed-bed gasifier. This patented design is engineered to support a variety of fuels, including manures and other biomass. Because the process takes place in an oxygen-starved environment, the formation of nitrous oxide (NO_x) is controlled. The low-pressure system allows for gasification with no or minimal carryover of particulate matter from most fuels.

INPUT FUELS

The input of the gasifier is a fuel with a moisture content of maximum 20-30%. If the fuel/input has a higher moisture content a pre-drying step has to be taken. If necessary this pre-drying step will be included in our gasification solution.

PROCESSING SYNGAS

The main product of gasification is carbon monoxide (CO) with some hydrogen and methane gasses, called synthesis gas (syngas). The syngas composition is fuel dependent, with temperatures typically ranging between 800-850°C. As soon as the syngas leaves the gasifier and flows into the thermal oxidizer, ambient temperature air is introduced to oxidize the syngas, with the CO being converted to carbon dioxide (CO_2). Retention time in the oxidizer is 1.2/2 sec (depending on local legislation). In this process a hot air stream is produced (energy content between 5.5-6.1MWth) of about 1000°C.

HEAT, STEAM AND ELECTRICITY

The ability to use the thermal energy product as direct heat, steam or electricity is a simple matter of adding equipment. The modular design makes construction quick and easy, and the addition of components is comparatively simple.

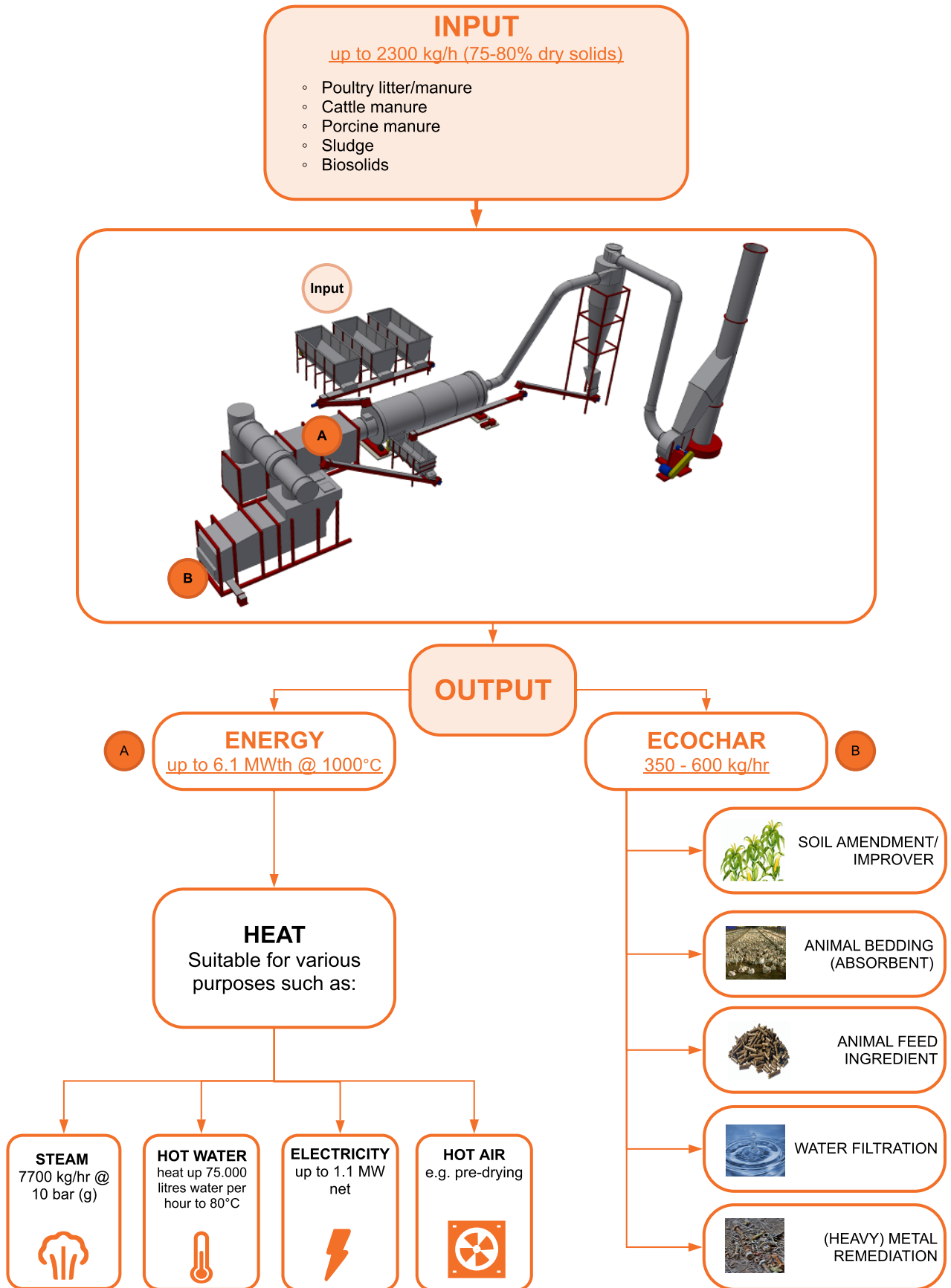
SOLID OUTPUT ECOCHAR

The solid output of the system is called EcoChar. Temperature control and retention time are critical in the quality of EcoChar, and these factors may vary depending on its application. In our gasifier temperature and retention time can easily be controlled to ensure the required output (for both the carbon monoxide and the quality of the EcoChar). The EcoChar still contains the mineral ash and fixed carbon which offers great environmental advantages and economic value.

ECONOMICS

Our gasification solution can be used to take care of your waste streams and convert them into multiple revenue streams. Each project varies by fuel type, project size, and needs of the host facility. There are multiple value streams applicable that have a positive influence on the economics/ROI of our gasification system. These are the key to a short payback period. Mavitec Environmental provides economic modeling to help you evaluate your potential projects, and not only solve your waste disposal problem but make it a feasible project.

Gasification: input & output



EcoChar: a powerful soil improver



The solid output of the gasification system is called EcoChar. This solid carbon-rich material is obtained from the carbonisation of biomass and contains a high content of P, K, Ca and Mg. Because of these properties EcoChar will greatly improve soil fertility, lowers the amount of nutrients or fertilizer needed and reduces your carbon footprint.

ECONOMIC VALUE

EcoChar still contains the mineral ash and fixed carbon which offers great environmental advantages and economic value. EcoChar can hold up to 2.5 times its volume in moisture. It is valuable for



improving stability in soil as it is retained in the soil over many hundreds of years, unlike fertilisers which typically require annual application.

VARIETY OF USES

EcoChar also has a variety of other uses, including animal feed supplements, animal bedding, active coal filtration and use as a water filtration medium. Sustainable EcoChar is one of the few technologies that is relatively inexpensive, widely applicable, and quickly scalable.



PROPERTIES

1. High content of P, K, Ca and Mg
2. Dry and free from pathogens
3. Holds 2.5 times its own weight with moisture
4. Guarantees less "soak-away" from high quality nutrients
5. Odourless

MAIN USES

- Soil amendment / improver (fertilizer)
- Animal bedding (absorbent)
- Animal feed ingredient
- Water and active coal filtration
- (Heavy) metal remediation
- Air treatment



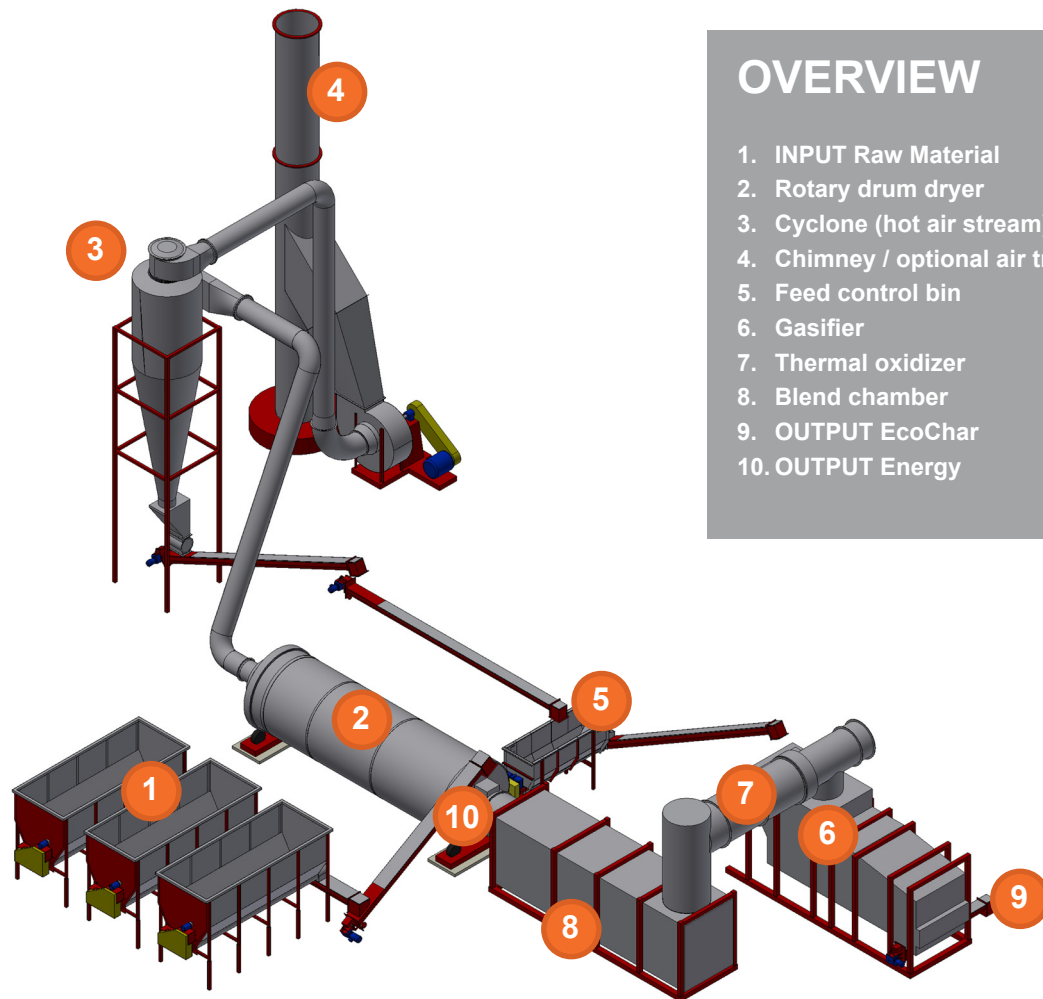
ADVANTAGES OF ECOCHAR*

- Valuable and carbon-rich: high P, K, Ca and Mg values
- Free from pathogens, E-coli, growth hormones and residues from medication, since they are burned in the gasifier
- It can hold up to 2.5 times its own volume in water
- Increases plant growth and improves performance over time
- Increases the water retention properties of soil, so less water is needed to keep the soil moisturized
- Releases the amount of nutrients gradually and hereby lowers the amount of fertilizer and nutrients needed
- Commercial value between € 100 - 800,- per ton, depending on composition and end-use purpose
- Surface (BET): up to 260 m²/gram

* depending on feed stock

More information: www.mavitecenvironmental.com

Gasification: the system

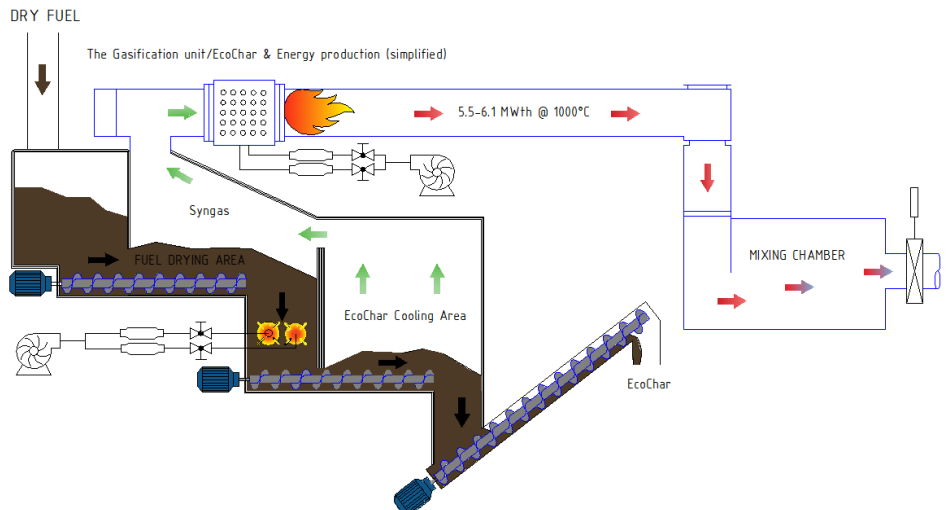


OVERVIEW

1. INPUT Raw Material
2. Rotary drum dryer
3. Cyclone (hot air stream)
4. Chimney / optional air treatment
5. Feed control bin
6. Gasifier
7. Thermal oxidizer
8. Blend chamber
9. OUTPUT EcoChar
10. OUTPUT Energy

PROCESS

Pre-dried manure or other compatible fuel is inserted (top-left in picture). This dry fuel is then heated in an oxygen-starved environment, which produces a syngas and a solid. This solid is a char that still contains the minerals from the inserted input, called EcoChar. The syngas consists of mostly CO, that will be oxidised and combusted to generate a very hot air stream.





Service you can count on!

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