Agricultural Waste Recycling

Cost of 1 kW·h of electricity produced by EcoMachine Gas during agricultural recycling is less than 1 rouble

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**EcoMachine Gas**

EcoMachine Gas allows you to produce electrical and heat energy while recycling agricultural waste:

- Chicken excrement (with or without litter)
- Plant growing waste (straw, sunflowers husks, rice peelings, plant stems)
- Woodwork waste (wood chips, bark etc.)

When recycling 1 ton of agricultural waste, ECOMACHINE GAS produces:

- up to 900 kW·h of electrical energy
- up to 3 Mcal of heat energy

*Humidity of waste is not higher than 20%*
The foundation of the technological process of producing energy resources from agricultural waste are the principles of thermochemical gasification.

The point of the recycling process is the production of combustible gas by the heating of organic raw materials. Carbon monoxide, methyl gas, methane, hydrogen, gaseous hydrocarbons and other components in different proportions are obtained by heating or burning of waste in the absence or lack of oxygen.

The heat breaks chemical bonds in molecules of complex hydrocarbons contained in the waste (as well as any other organic or hydrocarbon fuels). At the same time in the process of combining carbon and hydrogen atoms the heat isolates with the oxygen. Thus the process supports itself.

If there is not enough air during this process enough heat is produced for the decomposition of hydrocarbon molecules, but the products of process are carbon monoxide and hydrogen flammable gases. Other products of incomplete combustion are mostly carbon dioxide and water.

To get maximum efficiency from the technological process, depending on the kind of waste, it may need prior preparation of waste (chopping, drying). SPA ECOMASHGROUP also develops and supplies technological lines for waste preparation.

DESCRIPTION OF OUR MACHINE

- EcoMachine Gas has a wide family with efficiency of one unit from 10 to 1000 kW·h of generated electrical energy.

- EcoMachine Gas uses the principle of cogeneration (generation of electrical and heat energy at the same time)

- On average, during 1.2 kg of agricultural waste recycling with humidity not higher than 20% EcoMachine Gas is able to generate 1 kW·h of electrical energy and 1 Mcal of heat energy
main stages of technological process

- **Gasification** is a process of partial oxidation of carbon-containing raw materials with obtaining of gaseous source of energy - generating synthesis gas.

  Obtained synthesis gas consists of carbon monoxide hydrogen, methane, carbon dioxide, a small amount of hydrocarbon compounds of higher order, such as methane and ethane, contains water vapor, nitrogen (if air blast) and a variety of impurities such as resins, carbonaceous particles matter and ash. Air is used as an oxidizer in process of gasification.

- **Power of gas-piston electric generator**

  After preparation system synthesis gas goes to power gas-piston electric generator optimized for power with low-calorie synthesis gas.

  The exhaust gases at the outlet gas-piston power generator are comparable in composition and concentration of harmful substances with exhaust gases of the standard engine in which fuel is natural gas, and do not make any environmental threat.

- **Multistage system of synthesis gas preparation**

  Obtained synthesis gas goes through a multilevel preparation system with the cooling and cleaning mechanical impurities and resins.

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composition of the eomachine gas

1. Line for waste preparation (if necessary).
2. Box with airtight delivery system to the reactor for waste accumulation.
3. Reactor of thermochemical gasification.
4. Complex of synthesis gas cooling and cleaning, including elements of mechanical, centrifugal, liquid, electrostatic and chemical cleaning.
5. Receiver-storage device of synthesis gas (if necessary).
7. Automatic, alarm and control systems.
## PERFORMANCE ATTRIBUTES

<table>
<thead>
<tr>
<th>№</th>
<th>PERFORMANCE ATTRIBUTES OF ECOMACHINE GAS</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Generated electrical energy, kW·h</td>
<td>from 10 to 1000</td>
<td></td>
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<tr>
<td>2</td>
<td>Generated heat energy, Mcal/hour</td>
<td>from 10 to 1000</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Efficiency of one unit for bioresources recycling (peat, wood humidity no more than 20%), ton/24 hour</td>
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<td></td>
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<tr>
<td></td>
<td>- peat (ready peat fuel)</td>
<td>from 0.3 to 30</td>
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<tr>
<td></td>
<td>- wood waste (wood chips, bark, scraps, branches, stubs)</td>
<td>from 0.3 to 30</td>
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<tr>
<td></td>
<td>- wood waste with steeps (ties, posts, flake boards, fibreboards)</td>
<td>from 0.3 to 30</td>
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<td></td>
<td>* efficiency depends on the density, humidity and waste composition</td>
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<tr>
<td>4</td>
<td>Humidity of raw products, % no more than</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Size of the raw materials, mm no more than</td>
<td>200 X 50 X 50</td>
<td></td>
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<tr>
<td>6</td>
<td>Category of power supply</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Staff for one plant</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- operator</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- odd-job man</td>
<td>1</td>
<td></td>
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<tr>
<td>8</td>
<td>Rated power of internal power consumption units of the complex, kW·h</td>
<td>1-10</td>
<td></td>
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<tr>
<td>9</td>
<td>Calories of the produced synthesis gas, MJ / m³ *</td>
<td>12-18</td>
<td></td>
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<td></td>
<td>* depends on kind of waste</td>
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<tr>
<td>10</td>
<td>Bottom ash after recycling, in % of the amount of waste *</td>
<td>2-7%</td>
<td></td>
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<td></td>
<td>* depends on kind of waste</td>
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<tr>
<td>11</td>
<td>Warranty, months</td>
<td>12</td>
<td></td>
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<tr>
<td>12</td>
<td>The life duration of the plant before overhaul, months</td>
<td>72</td>
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ADVANTAGES OF OUR MACHINE

1. During thermo-chemical destruction waste are converted first into syngas, which is then used to power an internal combustion engine that provides the best environmental performance.

2. The technological process provides environmentally safe production of electrical energy while waste recycling (chicken excrement).

3. The technological process of bioresources recycling doesn’t need extra fuel for generation of electrical energy which is why it requires minimal maintenance costs.

4. High efficiency of energy transformation. From 1.2 kg of waste you can get up to 1 kW·h of electrical energy and up to 1 Mcal of heat energy.

5. The technology provides a reduction in the volume of solid waste recycled up to 95%.

6. The technology provides use of renewable alternative sources for electrical energy generation.

7. Air emissions are no higher than standard gas-piston power plants make.

8. Recycling plants with modular components provide optimal processing power, covering different needs.

9. The technology is compact and needs a small area.

10. There are no specific requirements for the area and communications.

11. Potential sources of income:
   - Payment (cost saving) for waste recycling, wood waste with steeps (flake boards, fibreboards, ties, posts).
   - For own use / sale of electricity
   - For own use / sale of thermal energy

12. The technology gives the right to receive subsidies and other preferences (including tax) taking into account the innovative process of using alternative energy sources.

13. Possibility of building a mobile complex.

14. Possibility of buying the complex using leasing.
WARRANTY AND SERVICE

The warranty period is 12 months (can be increased)

We have a "hot line" for our clients. You can call and get expert advice on the operation and maintenance of the plant. If the problem cannot be resolved independently, within a day repair team will come to customers (during the warranty period free of charge, after the expiration of the warranty period, technical support is provided through contractual relationships).

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