Refinery waste recycling

*Refinery waste recycling with the new EcoMachine AMR-100*

**ECOMACHINE AMR-100**

The equipment allows not only environmentally safe recycling of hazardous waste, but also obtaining of liquid products: electricity and heat, as well as the liquid fraction of black oil, suitable for use as heating fuel for boilers or further refined into commodity fuels (gasoline, diesel fuel)

When recycling 1 ton of oil waste EcoMachine AMR-100 produces

*accurate data depend on kind of waste*  

- **Up to 500 kW·h** of electrical energy  
- **Up to 400 Mcal** of heat energy  
- **Up to 400 kg** of liquid fraction
Condensation of vapor fraction is done by its indirect cooling with liquid coolant at the same time as centrifugal separation and sequential passage of the gas fraction of a multistage system of cooling and cleaning. Uncondensed gases that have passed a multi-stage cleaning system and cooling system are sent to supply the internal combustion engine that runs on gas and diesel cycle.

The engine is paired with the electric generator of 100 kW·h for generation of electrical energy supplied to the consumer. In accordance with customer desire cogeneration is implemented with the simultaneous production of electricity and heat.

Refinery waste recycling with the new EcoMachine AMR-100 is absolutely environmentally friendly - all emissions meet the standards of the MPC.
<table>
<thead>
<tr>
<th>№</th>
<th>PERFORMANCE ATTRIBUTES OF THE COMPLEX ECOMACHINE AMR-100</th>
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<tbody>
<tr>
<td>1</td>
<td>Generated electrical energy, kW·h</td>
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<tr>
<td>2</td>
<td>Generated heat energy, Mcal/hour</td>
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<tr>
<td>3</td>
<td>Waste recycling efficiency, m³ / twenty-four hours</td>
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<tr>
<td></td>
<td>oil-slimes</td>
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<tr>
<td></td>
<td>plastics, polymers</td>
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<td></td>
<td>industrial rubber products</td>
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<tr>
<td></td>
<td>railroad ties / sleepers</td>
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<td></td>
<td>oily soil</td>
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<td>medical waste</td>
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<td></td>
<td>municipal solid waste and their materials</td>
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<td></td>
<td>industrial solid waste</td>
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<tr>
<td></td>
<td>* efficiency depends on the density, humidity content, waste composition and can be increased</td>
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<tr>
<td>4</td>
<td>Humidity of raw products, % no more than</td>
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<tr>
<td>5</td>
<td>Size of the raw materials, mm no more than</td>
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<tr>
<td>6</td>
<td>Category of power supply</td>
</tr>
<tr>
<td>7</td>
<td>Staff for one plant:</td>
</tr>
<tr>
<td></td>
<td>operator</td>
</tr>
<tr>
<td></td>
<td>odd-job man</td>
</tr>
<tr>
<td>8</td>
<td>Volume of water section, m³</td>
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<tr>
<td>9</td>
<td>Consumption of diesel fuel at work on the gas-diesel power, L/hour*</td>
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<tr>
<td></td>
<td>* with a maximum calorie of synthesis gas produced from waste</td>
</tr>
<tr>
<td>10</td>
<td>Rated power of the internal energy consumers of the plant, kW·h</td>
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<tr>
<td>11</td>
<td>Calories of the produced synthesis gas, MJ / m³ *</td>
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<td></td>
<td>* depends on kind of waste</td>
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<tr>
<td>12</td>
<td>Bottom ash for recycling, in % of the amount of waste *</td>
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<tr>
<td></td>
<td>* depends on kind of waste</td>
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<tr>
<td>13</td>
<td>Warranty, months</td>
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<tr>
<td>14</td>
<td>The life duration of the plant before overhaul, months</td>
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<tr>
<td>15</td>
<td>Dimensions of the plant, W x L x H, mm, no more than (see the layout of the equipment)</td>
</tr>
</tbody>
</table>
Thermochemical destruction is an environmentally safe process

Thousands of toxic and poisonous compounds (dioxins, furans) are produced released into the atmosphere during the combustion of oil sludge.

The main difference of thermo-chemical destruction process from combustion is the lack of oxygen that is why a lot of toxic compounds are not generated (or just scanty amount but all is conforming to emissions standards).

The equipment for combustion of oil sludge should have a major gas cleaning system, which is very expensive both for the initial cost and running costs (high power inputs and large amounts of sorbent materials, which also should be recycled).

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 an expert advice on the operation and maintenance of the plant.

If the problem cannot be resolved independently, within a day a 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).

The life duration of the plant before overhaul is 6 years.

The cost of repair is 20-25% of the sales cost of the plant and takes 7 days.

Routine maintenance (oil and oil filter change in the engine, checking the critical nodes set) is made every 300 hours of operation of the plant (duration about 3 hours)
ECONOMICS OF THE WASTE RECYCLING PROCESS WITH ECOMACHINE AMR-100

Economic indicators are made up of revenues and expenses:

**INCOME**

- **Fee for waste recycling or savings** on waste disposal, fines, etc.
- **Power** from 100 kW·h is available to supply the consumers without break.
- The synthesis gas produced while waste recycling (calorific value from 12 to 30 MJ/cubic meter, depending on the type of waste) feeds the gas-diesel power plant. The power plant runs on gas and diesel mode, the main type of fuel is syngas. In addition, you can use diesel fuel (diesel fuel is used to provide continuous power regardless of changing caloric of produced synthesis gas with changing of the composition and type of industrial waste).
- **Liquid Fuel Oil factions** depending on the type of waste can be suitable as fuel oil for boilers,
- The solid residue depending on the type of waste can be suitable for the manufacture of dyes sorbents, and fillers for foam, concrete, addition for road
- **Thermal energy cogeneration** is used to heat the cooling system and exhaust gases of internal combustion engine.

**COSTS**

- **Diesel** (average consumption from 3 to 5 liters per hour) depends on the type of waste and a complete set of equipment options,
- **Wages of employees (staff 2 people).**

*Actual results of the technological process can be different, it does depend on the different types of waste, and as a consequence, different caloric produced synthesis gas.*
ADVANTAGES OF ECOMACINE AMR-100

The plant is superior to combustion equipment from the technical and environmental points of view (technically more advanced process with substantially lower operating costs.)

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

The technological process provides an environmentally safe wide range of solid waste recycling, including healthcare and other dangerous wastes.

There is no need to pre-sort of waste, what saves operating costs.

The technological process of waste recycling requires minimal maintenance costs.

High energy conversion efficiency i.e. up to 95% of the energy of waste goes to synthesis gas.

The technology is also environmentally safe for medical and other hazardous waste recycling.

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

As a result the municipal solid waste recycling it is possible to commercially use of bottom ash (carbon black, construction, and petrochemicals).

The technology allows renewable alternative sources (waste) for generation of electricity.

11. Air pollution is less than from diesel power station makes.

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

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

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

15. Potential sources of income:
   — Payment for waste recycling,
   — Recycled materials sale (with the option of pre-sorting)
   — For own use / sale of liquid fuels,
   — For own use / sale of electricity
   — For own use / sale of thermal energy

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

17. Possibility of buying the complex using leasing
DOCUMENTS

Patent for invention №2431778

Certificate of State standard specification

Licence for use of equipment

Inspection of industrial safety
ADVANTAGES OF OUR EQUIPMENT

Use of EcoMachine AMR-100 for waste recycling allows you to get ecological and economic effects at the same time:

- **the ecological effect is due to the fact that** area for waste burial will stop rising, the level of soil, underground water and air pollution will reduce;

- **the economic effect is to get profit out** of waste recycling, which becomes raw material. The lack of ecological payment for waste placement and recycling increases economic effect.

Currently the process of thermo-chemical destruction (pyrolysis) has been established as a technology of thermochemical conversion of carbon-containing substances with high potential, especially for the high yield of liquid fuels and chemical products.

Pyrolysis is used to obtain the maximum amount of either gas or liquid waste in accordance with the fixed temperature of the process.

Pyrolysis allows conversion of carbon-containing raw materials into an energy valuable synthesis gas, which can be used for generating heat and electrical energy.

Innovative technologies underlined in the creation of universal systems for industrial waste recycling with EcoMachine AMR-100 can turn waste into not only high quality products - electric and thermal energy available to supply all consumers - but also into liquid fuel fractions which can be used as fuel oil for boilers or further refined into commodity fuels (gasoline, diesel fuel).

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