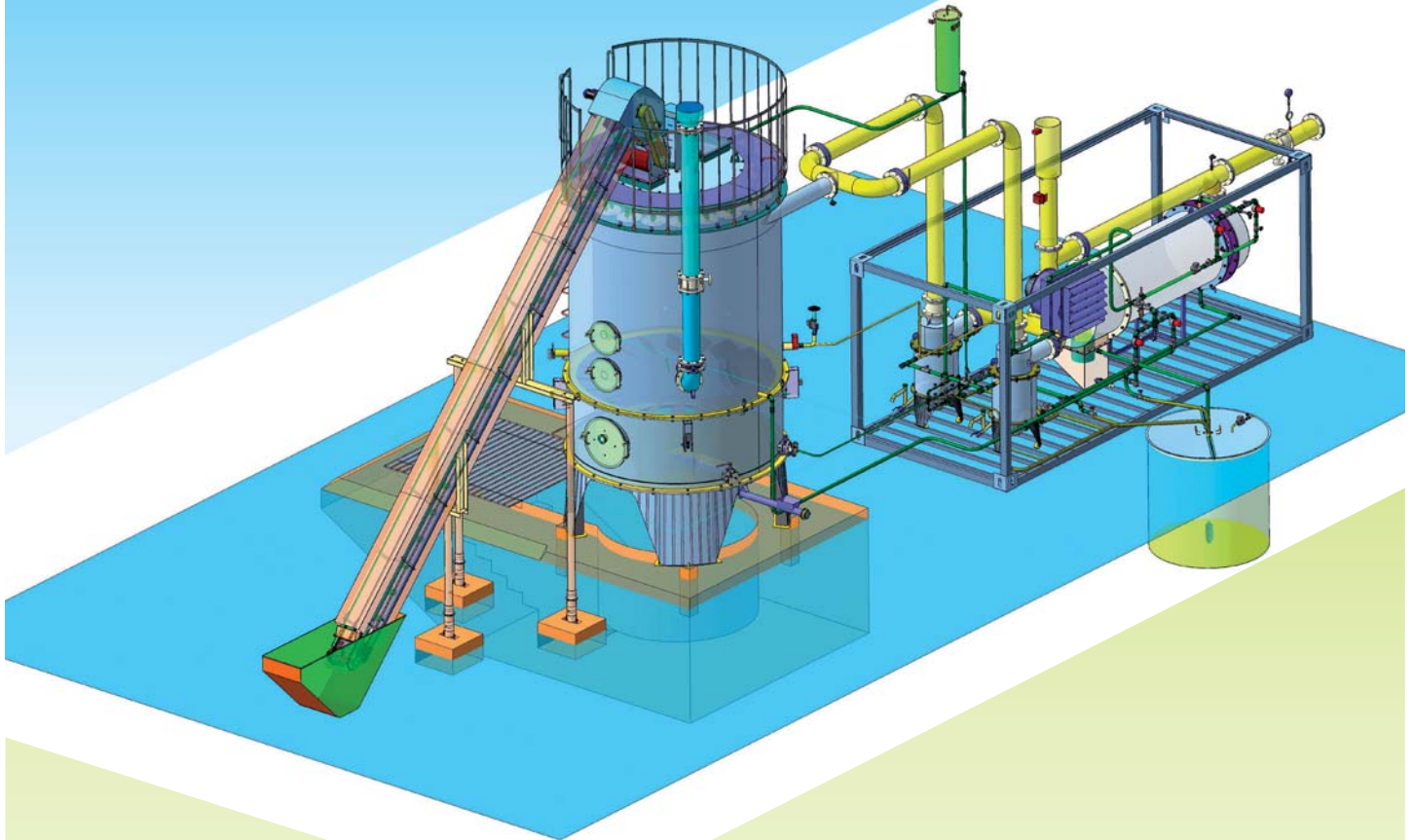
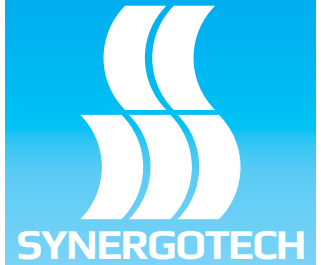


# ECOLOGICAL ENERGY-GENERATING COMPLEX



## WHAT IT IS AND WHAT IT DOES...

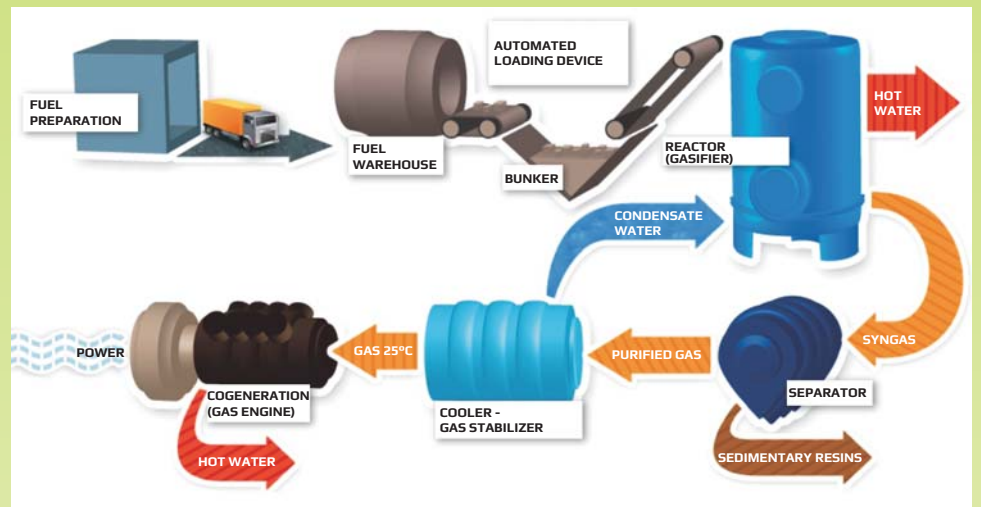
Ecological energy-generating complex (EEGC) is an installation for ecological processing of biomass and organic waste into electricity, heat and liquid hydrocarbons by autothermal gasification technology. It enables to obtain synthesis gas from all types of waste from carbon-containing materials such as coal of different brands, coke, oil shale, peat, and combustible waste:

- Logging and wood processing enterprises, felling of forests and green spaces in urban areas;
- Livestock and poultry production (manure, chicken manure, slaughterhouse waste and carcasses of dead animals);
- Crop - straw, stems, fruits, etc.;
- Agricultural products processing enterprises (flakes, cakes, nuts, etc.);

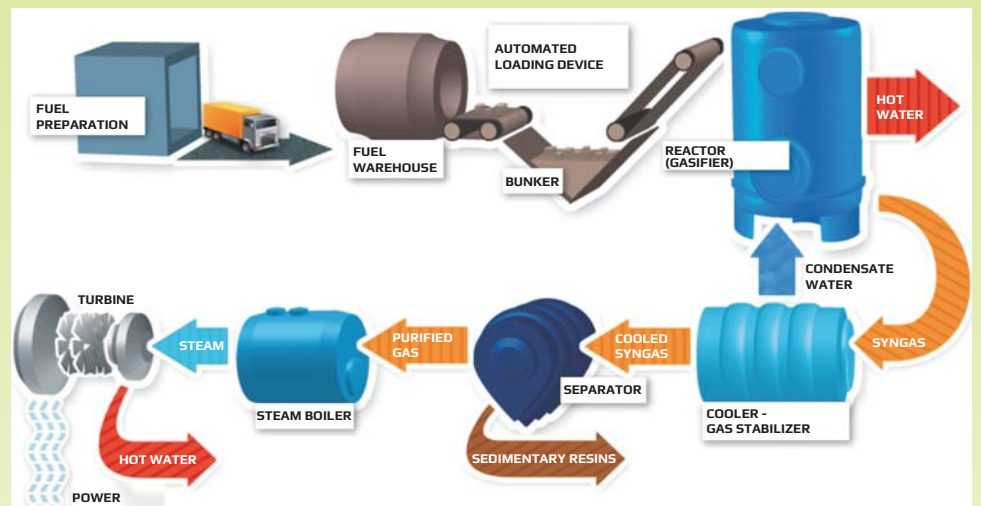
- Petroleum and petrochemical industry - oil sludge, plastics and rubber waste (tires) and others;
- Textile and apparel industry;
- Medical waste (safe utilization and detoxification);
- Water treatment plants for domestic water outlet-waste mud;
- Plants and equipment for the processing of municipal solid waste - combustible material remaining after separation.

EEGC consists of vertical body - reactor (gasifier) with automated fuel loader, horizontal body - located in a 40-foot container treatment device, gas cooling and stabilization devices and control panel of the complex.

## INTERNAL COMBUSTION GAS ENGINE TECHNOLOGICAL SCHEME:



## STEAM BOILER AND TURBINE TECHNOLOGICAL SCHEME:



## HOW IT WORKS...

Technology for obtaining ecologically clean energy from waste treatment of biomass and other organic substances is leading worldwide in terms of its technical, operational and economic indicators. Developed for obtaining syngas by thermochemical decomposition of organic matter to gas forming parts at incomplete oxygen oxidation. This means that organic matter is initially subjected to combustion in oxygen deficiency to yield non-burning gas - carbon dioxide  $\text{CO}_2$ , water vapor  $\text{H}_2\text{O}$  and unoxidized carbon  $\text{C}$ , which later appears as reagent and creates regeneration layer. Carbon dioxide and water vapor forcibly sweep through this layer, enter into chemical reaction with the reagent and form combustible gas (methane  $\text{CH}_4$ , carbon monoxide  $\text{CO}$ , hydrogen  $\text{H}_2$ , complex hydro-

carbons  $\text{C}_n\text{H}_m$ ), called synthesis gas.

Depending on the type of raw material preparation is needed to reach the type (size, moisture content, etc.) suitable for submission to the gasifier. Processed material is stored near the reactor. Automated loading device feeds gasification material. The reactor converts it into synthesis gas. After purification in separator and cooling in gas-stabilizer the generated gas can be used to obtain electricity and heat using a gas engine or a steam boiler and a turbine. Heat in the form of hot water is produced as a side effect of the processes of gas generation, its cooling and of production of electricity. After purification of the gas small amounts of sedimentary resins are released.



## WHAT IT DISTINGUISHES WITH...

This technological solution is characterized by the following features:

- High efficiency in terms of raw material used. It needs between 500 and 650 kg wood waste to produce up to 1500 kWh of electricity.
- High calorific gas generation. Calories average from 2500 to 3900 kcal/m<sup>3</sup> depending on the gasified material.
- Very low power consumption for its own needs. Power needed in normal operating mode is 4 kWh, and in start-up and extreme loads - 7 kWh (data of EEGC-1500 installation, which generates 1500 m<sup>3</sup>/h synthesis gas with the potential to produce 1.5 MW<sub>e</sub>/h electrical power and 1.8 MW<sub>t</sub>/h heat output).
- High degree of purification of the resulting gas. The main problem of all gasification equipment manufacturers is the inability to purify the resulting gas from tar and other harmful impurities. Production of synthesis gas by EEGC generates less than 0.1 mg/m<sup>3</sup> presence of resins in the gas.

- Versatility of the wastes used as fuel. Developed automatic control system of technological processes in the gasification reactor and purification system allow rapid switching from one type of waste to another or to their combination. In the latest case the initially selected combination of wastes remain constant to generate gas with the same chemical composition.
- High degree of environmentality. Concentrations of environmentally harmful substances in the exhaust gases of power generating machines are well below the established norms of the EU, regardless of the selected waste /as raw material/ for production of synthesis gas by gasification method. The application of this technology allows the construction of waste-free energy production. In biomass processing the residual ash is fertilizer and separated resin - raw material for cosmetic and pharmaceutical industries.



# ECOLOGICAL ENERGY-GENERATING COMPLEX

## AND FINALLY...

With this technology and technique based on modular principle can be constructed projects with great electrical power (over 100 MW<sub>e</sub>/h) and great heat output (over 300 MW<sub>t</sub>/h).

### ELECTRICITY PRODUCTION PARAMETERS OF EEGC

Productivity of synthesis gas (m <sup>3</sup> /h)	Potential electrical capacity to (kW)	Indicative consumption of raw materials by type (kg/h)*				Weight** (kg)	Dimensions *** (m)	Accompanying heat output up to (MW)
		Biomass from farming, poultry, municipal solid waste	Sunflower husk and rice bran	Wood (straw-briquettes)	Peat briquettes, Lignite coal / Flame coal			
150	130	73	77	65	58 / 41	4800	5 x 1.7 x 3.5	0.17
300	258	129	136	115	103 / 72	6000	6 x 2.1 x 4	0.33
500	500	208	219	247	186 / 150 - 130	8000	11 x 5.2 x 5.1	0.75
1500	1000 - 1500	650	686	500 - 700	420 / 342 - 291	24000	13 x 7.5 x 6.1	2.3
3000	2000 - 2800	1300	1372	987	745 / 606 - 516	26000	15 x 11 x 6.1	3.8

\* - at 15% moisture content of the feedstock for gasification;  
 \*\*, \*\*\* - tentative data depend on the type of equipment.

TECHNOLOGY AND EQUIPMENT WITH «ECOLOGICAL ENERGY-GENERATING COMPLEX» TRADEMARK ARE DEVELOPED AND PATENTED BY RUSSIAN COMPANY «SINTEZ» SPE (7, MALTSEVA PASS., OFFICE 309, SAMARA, RUSSIA, TEL. +8 846 2793083, +8 963 9139265, FAX +8 846 2793073, www.npp-sintez.ru, npp-sintez@yandex.ru).



PATENT CERTIFICATE:  
METHOD FOR RECEIPT OF SYNTHESIS GAS AND REACTOR (GASIFIER) FOR ITS IMPLEMENTATION



AWARD DIPLOMA:  
100 BEST INVENTIONS OF RUSSIA

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