

Ministry of the Environment has been implementing the **GreenEvo project - Green Technology Accelerator**. It aims at international transfer of innovative pro-ecological technologies. Within the framework of the project, the Ministry identified the best Polish solutions, including:

- **wastewater and water treatment technologies** tested by Western European cities and implemented e.g. in Beijing (Biogradex Holding Ltd, WOFIL Robert Muszański, PP-EKO Ltd);
- **innovative hazardous waste treatment** (ECOTECH POLAND Ltd, PPHU MARBET-WIL Ltd);
- **solutions supporting the use of renewable energy sources** including agricultural briquette-making machines and solar panels (Asket Roman Długi, Sunex Ltd, Watt Ltd, Neon Wojciech Norberciak);
- **technologies for coking industry** (Energoinstal Inc.)
- **energy saving technologies** (Promar Ltd, LEDIKO Walendowski i Wilanowski, Petroster ).

In the above-mentioned areas the Polish industry of environmental technologies plays an important role on the global market, offering tested and innovative solutions.

The main objective of the Green Technology Accelerator is to provide international markets with a guaranteed quality of Polish environmental technologies. The project involved carrying out studies of selected international markets and identifying needs of the countries to which technologies are transferred.

The Polish companies selected in the GreenEvo project have undergone a series of specialized trainings. They have been well prepared for managing their products in a competitive manner; they have been educated in terms of specific legal regulations as well as technical standards applicable on those markets. One can certainly state that the winners of the GreenEvo project are ready for sharing their technologies, experience and knowledge with countries that face environmental problems.

Poland as a country with significant experience in the system transformation process is well aware that without adequate funds for effective and innovative environmental technologies, sustainable development is not possible. The GreenEvo® brand is a symbol of Polish experience and willingness to share it with other countries which now undertake similar upgrading actions. Moreover, it guarantees

the quality of Polish technologies. The winners of the project comprise a group of the best and most innovative providers of green technologies being developed in Poland.

The aforementioned studies, which were carried out within the framework of the project, allowed for identifying and defining environmental protection problems occurring in Moldova.

This country faces a huge problem, namely that of neutralising of hazardous waste. It lacks adequate technologies, and where they do exist - their number is not sufficient. In many cases, hazardous waste, without any security measures, is stored in open containers outdoors.

It is possible to improve this situation by transfer of advanced technologies adapted to recycling of waste containing large amounts of pesticides.

The Enviromix technology offered by Ecotech Ltd, which is designed for neutralising and recycling of substances harmful to the environment is ideally suited to the conditions currently present in Moldova. This is an innovative solution that, unlike the other ones intended to provide stabilization, ensures low investment outlays and a lifetime safety guarantee for the environment. There are also some alternative solutions, i.e. SULTECH (provided by PPHU MARBET-WIL Ltd) which is equally effective in dealing with hazardous waste by stabilizing and solidifying them in sulphur concrete.

A serious problem faced by large cities in Moldova is a strong contamination of groundwater and lack of modern wastewater and water treatment plants. The solution to this problem may also be a transfer of the Biogradex® technology offered by Biogradex Holding Ltd which uses low-rate activated sludge to treat municipal and industrial sewage. A wastewater treatment plant based on the Biogradex® technology allows for multiplying the intensity of the treatment process, unlike other competitive solutions. Another, equally effective method of treatment of drinking and industrial water or sewage is the ozonation technology proposed by Wofil Robert Muszański. This solution is intended for all customers treating water in closed circulation systems, and unlike the competitive ones, all of its systems are fully computerized and monitored via the Internet, as a result of which it is possible to install them anywhere in the world while ensuring the full and prompt support.

Moldova is currently in the group of countries facing significant environmental pollution and shows great interest in alternative pro-ecological solutions for production of energy from renewable sources, which also allows for the intensive development of local agriculture. For this purpose, it is recommended to use straw briquetting machines. Such machines (BIOMASSER®)

are manufactured by Asket Roman Długi. As a result of many straw and hay processing operations, they produce ecological Golden Carbon (Złoty Węgiel®). Unlike other briquetting technologies available on the market, it is possible to use damp agricultural biomass, without the need of drying it, at the lowest purchasing and operating costs of these machines.



## 1. ASKET – Roman Długi

*For those needing cheap fuel we offer simple, mobile BIOMASSER® machines for the production of ecological Golden Carbon (Złoty Węgiel®) of straw and hay. Unlike other technologies, we briquette damp agricultural biomass, without the need of drying it, at the lowest purchasing and operating costs of these machines, as well as provide full mobility of the plant.*

BIOMASSER® technology includes briquetting straw at a humidity rate of 15%-30%, without the need of prior drying. The natural raw material is briquetted without adding any adhesives, binders, etc. and as a result, we obtain a 100% organic fuel - straw briquettes called "golden coal." Consumption of electricity for the production process is very low and amounts to 40÷70 kWh on average per 1 ton of briquettes (depending on the plant size). This technology is based on the principle of compression of crushed biomass delivered to the screw chamber of the briquetting machine, which is pushed outside in the form of briquettes.

The briquetting technology of damp agricultural biomass BIOMASSER® offered by Asket Roman Długi is used in plants for the compaction of agricultural waste (mainly straw, grass) intended for energy purposes.

- The machines are easy to use and require no special qualifications.
- As there is no need to dry the raw material before briquetting, there is no fire risk.
- Low costs of purchasing and maintenance of dryer.

This is the latest solution offered by BIOMASSER® MOBILE. This is a complete set of straw and grass briquetting machines built on a wheel trailer to be used in the field, directly by the stack. The production line is composed of a feed table for straw bales, a mill, chaff pods and briquetting devices. The machines are powered from the electricity network or an engine-generator. The last time the company manufactured BIOMASSER® MOBILE was for a Swedish customer; this machine is powered from an engine-generator mounted on a wheel trailer. Its capacity amounts to 420kg/h.

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## 2. BIOGRADEX Holding Ltd

*For entrepreneurs who are looking for an efficient way to get rid of unnecessary liquid waste we offer wastewater treatments using the Biogradex® technology. Unlike the competitive ones, our solution is innovative and allows for multiplying the intensity of the treatment process.*

The Biogradex® solution is an effective technology of wastewater treatment using an activated sludge method which allows for the protection of water against pollution. The uniqueness of the Biogradex® technology involves the application of additional physical treatment in the wastewater treatment process - a vacuum system is used in order to degas a mixture of activated sludge prior to its introduction to the secondary settling tank. As a result of this treatment, sludge flocs and liquid are removed from gas bubbles, which allows for increasing the amount of sediment in the process to MLSS = 7000-9000 mg/l and the effective sedimentation in the secondary settling tank.

- The company holds appropriate patents for this technology - not only Polish, but also European, American, Canadian, Australian, Brazilian, Russian and Japanese. This is an innovative solution, moving technology to a new level.
- In comparison to the other wastewater treatment technologies, the Biogradex® solution increases the amount of sludge in the chambers by 80-100% and thus, the efficiency of a wastewater treatment process is considerably improved.
- With the increased amount of activated sludge, the treatment process is very effective at low rate of energy consumption.
- It also allows for reducing the cubic volume of buildings under construction, so it is cheaper than the well-known solutions applied worldwide. And in the case of upgrading the existing plants, it can increase their productivity and efficiency.

In cooperation with a Chinese partner, we designed and applied the Biogradex® technology in the wastewater treatment plants in Beijing, built in 2004, which previously had problems with obtaining a satisfactory result in the removal of nitrogen. 7 days after the implementation, the requested result was obtained due to increasing the concentration of activated sludge in chambers to 6kg/m<sup>3</sup>. The "Biogradex®" plant is mounted on one of the four routes of the flow of Q = 120,000 m<sup>3</sup>/d, whose calculation flow for the existing technology was Q = 90,000 m<sup>3</sup>/d. Thus, the Biogradex® technology, despite the overload, has obtained better results than technology working on a parallel route, where the flow was Q = 90,000 m<sup>3</sup>/d.

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### 3. ECOTECH POLAND Ltd

*For those needing an effective and cheap way to neutralise or recycle hazardous and toxic waste, we offer the innovative EnviroMix technology. Unlike other stabilization solutions, it is intended to provide low investment outlays and a lifetime Inc.fety guarantee for the environment.*

The stabilization process, being the basis for EnviroMix®, is a recognized global technology providing excellent results in chemical bonding and stabilization of hazardous waste. The use of such stability measures is supported by independent academic research and meets regulatory requirements in many countries. This process is used on an industrial scale for processing thousands of tons of contaminated soils, sediments, mine waste and by-products of industrial processes.

The application of the EnviroMix® technology allows for neutralising of contaminated soil, sludge and other solid waste containing both organic and inorganic compounds and minerals.

The EnviroMix® solution is considered to be the leading one in the processes of binding and stabilization of many types of hazardous waste and it represents a breakthrough in their neutralization. The stabilization of hazardous waste using the EnviroMix® technology is much more effective than the methods applied at present, which are based on the use of Portland cement.

- The company holds appropriate patents for this technology - not only Polish, but also European, American, Canadian, Australian, Brazilian, Russian and Japanese. This is an innovative solution, moving technology to a new level.
- In comparison to the other wastewater treatment technologies, the Biogradex® solution increases the amount of sludge in the chambers by 80-100% and thus, the efficiency of a wastewater treatment process is considerably improved.
- With the increased amount of activated sludge, the treatment process is very effective at low rate of energy consumption.
- It also allows for reducing the cubic volume of buildings under construction, so it is cheaper than the well-known solutions applied worldwide. And in the case of upgrading the existing plants, it can increase their productivity and efficiency.
- Excellent efficiency of the technology e.g. in relation to heavy metals, chlorinated pesticides, cyanide, PAHs and benzopyrene.
- Due to the character of binding pollutants by magnesium compounds, the EnviroMix® technology is resistant to the washing of pollutants.
- The main distinguishing feature of the technology is that it considerably reduces the need for a stabilizing material in relation to the waste unit mass.

This technology is particularly interesting due to the tightening of the EU law provisions governing the neutralising and storage of hazardous and industrial waste. These regulations require that waste be neutralised prior to its storage and, if possible - first undergo the recycling process.

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## 4. PP-EKO Ltd

*For customers in the aerospace and galvanic industries, needing very clean water for their processes, we offer ROVAPO - a closed water circulation technology - "zero discharge". Unlike other solutions, here the amount of consumed electricity and generated waste is minimized, ensuring the high rate of water recovered for re-use (over 95%).*

**ROVAPO** is an in-house developed solution of PPEKO. This is a family of systems of a "zero-discharge" type permitting the full recovery of water from sewage. Depending on the industry, it is used for the production of:

- a) water with conductivity of <10 ms (demineralized water) e.g. used in galvanic processes;
- b) deionized water of the pharmaceutical quality;
- c) water with parameters that make it possible to re-use it in production processes.

Our technology is a result of a specific knowledge of the whole team and is confirmed by a number of patents for galvanic applications. It comprises a series of treatment steps allowing to achieve the target objective: selection of streams and chemical treatment, membrane systems and evaporation systems.

The ROVAPO technology has been designed for galvanic sewage. In some cases, it may be enhanced with other components allowing it to be used for sewage other than galvanic - pre-treated chemically with biologically activated sludge utilizing UF membranes (MBR - AeroMem™).

- This technology allows for the recovery of wastewater with the efficiency above 98% (including the recovery of high-quality water from sewage susceptible to biological treatment).
- It is based on in-house developed software ensuring automatic work of the plant, regardless of the variable quantity and composition of wastewater from the production process, and guaranteeing its constant efficiency.
- It allows for minimizing the amount of solid waste - the only waste is sludge from chemical treatment and Inc.lt concentrate containing approximately 50% of dry matter.

In 2006 PP-EKO Ltd. realised a "turnkey" undertaking for WSK PZL "Świdnik" based on an in-house concept and own projects - this was the first modern wastewater treatment plant created on such scale in Poland, with a closed water circulation from a new electroplating plant. Instead of electroplating



wastewater discharged in the classical treatment process to the municipal sewerage system (which results in the lack of ability to meet certain parameters required by water supply companies), there is high-quality demineralized water created from sewage, having strictly guaranteed parameters, which is returned to production processes in modern electroplating plant manufacturing aerial components.

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## 5. WOFIL ROBERT MUSZAŃSKI

*For all customers using closed systems in water treatment processes we offer our water ozonation technology (water treatment without the use of chemical substances to its conditioning). Unlike the competitive solutions, all of our plants are fully computerized and monitored via the Internet, as a result of which it is possible to install them anywhere in the world while ensuring the full and prompt support.*

WOFIL Robert Muszański offers pro-ecological water treatment systems in the ozonation technology, without the need to use artificial chemicals such as chlorine, potassium permanganate, coagulants.

This technology is completely Incsafe, environmentally-friendly and based only on natural processes. The only difference is that the ozonation processes are much faster and can be fully controlled. WOFIL plants are fully computerized and can be monitored via the Internet, as a result of which it is possible to install them anywhere in the world while ensuring the full and prompt support. By applying the separation of technological processes in the plant into various modules, the manufacturer guarantees the increase of its reliability and continuous operation during maintenance and repair works. Multi-block ozone generators applied in this solution allow for alternate work of particular blocks and a possibility of their extension.

- There is no need to hire highly qualified technical staff to operate the plant.
- It minimises the risk of interruptions in the production process and lowers its operating costs.
- As a result of work of one or more ozone generator blocks, it is possible to adjust its performance to the current needs and reduce the rate of its wear and tear.
- The assembly of the Wofil plant or upgrading of the existing water treatment plant requires a small area.
- All of our components, elements, devices have relevant permits, approvals and certificates.

Wofil Robert Muszański carried out upgrading works in Przedsiębiorstwo Wodociągów i Kanalizacji Okręgu Częstochowskiego (Water Supply and Sewage Company of the Częstochowa Region). The contract included replacement of old ozone generators with high-tech block ozonizers, designed and manufactured by Wofil. The upgrading works also comprised the implementation of on-line monitoring and visualization of water treatment plant's operations. The water ozonation system of WOFIL applied in this company is an advanced water treatment plant which uses only electricity in the whole process.

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