



68

**Joint business**

The recycling line of Slovak construction is heading to the world mainly thanks to the deployment of (from left) Martin ŷach from Chemosvit, Vladimír Daniška from FORBES Energy and Marián Filek from Siemens.



# OIL Made of plastic

PLASTIC IS FLOODING THE PLANET AND WHOEVER INVENTS A WAY TO STOP THE AVALANCHE OF POLYMER WASTE WILL BE HUMANITY'S HERO. OR AT LEAST MILLIONAIRE. A UNIQUE RECYCLING LINE FROM SLOVAKIA IS ALSO CURRENTLY JOINING THE EFFORTS TO SAVE THE WORLD - VLADIMIR DANIŠKA FROM THE NITRIAN RESEARCH AND DEVELOPMENT COMPANY EUREX ENERGY, VYCHODNARSKY CHEMOSVIT AND TECHNOLOGY IS BEHIND IT.

GIANT SIEMENS. THEY ARE ALREADY SENDING THE FIRST LINES WORTH SEVERAL MILLION EUR FOR EXPORT.

TOMÁŠ NEJEDLÝ PHOTO: PETER STAS

PA RT NE RO MSERÍ Á LU IS



**EXIMBANKA SR**



# T

You know the alarming news - they have become a part of our daily lives. Of the many, let us recall only the shards. In ten years, the world has doubled the production of plastics to four hundred million tons per year. Half of used packaging, plastic bottles and other plastics end up in landfills.

A fifth floats in the seas and oceans or is blown over land by the wind. A fifth is burned in the furnaces of incinerators or cement plants and pollutes the air, less than ten percent is recycled. Scientists have found microplastics in the depths of sea trenches and at the ends of high mountains, they are part of our organisms. Activists refer to contemporaries as the "plastic waste generation" and international organizations warn with reports with titles such as "Drowning in Plastic".

Estimates say that by 2060, the annual production of plastics will increase fourfold.

#### Waste plastic

Daniška tried to recycle several types of mixed plastic. He has them brought from Slovakia and abroad, especially European Union countries.



The demand for technologies that could process and recycle plastics for reuse is therefore huge, not only in the European Union, which is trying to be at the forefront of the global movement to save the climate. Despite this, no company or technology that would bring a revolutionary solution has yet established itself in the world - although giants such as Shell, ExxonMobil, OMV and BASF are also investing intensively in new ideas.

Companies from Slovakia are also currently participating in the race to acquire top business and export items. The research and development company Eurex Energy is starting a joint business with the plastic group Chemosvit, which is one of the largest employers in the east of Slovakia, and the German technology giant Siemens. The result of the business alliance is a unique recycling line of Slovak design, which is supposed to supply Europe and the world with technology for the material recovery of mixed plastic waste.

## FIRST LINES FOR EXPORT

"So far we have sold four lines for several million euros, we have other orders in the form of contracts for future contracts from Poland, Austria, Germany, Bangladesh and the Philippines," says Vladimír Daniška, head of Eurex Energy, about first contracts. Daniška is a co-creator of the technology, which he worked on perfecting together with the team for over ten years. The Eurex team designed the technological part of the line, the Chemosvit Strojchem company from the Chemosvit group provides the mechanical production of the line, and Siemens the digital control center of the technology.

"Next year, we have allocated capacities for the production of ten lines and we are planning to expand the premises for the benefit of this production," adds Martin Žach from the management of the Chemosvit group - which at the same time uses the prototype of the line for processing waste from packaging production, which it has in Svit in the Tatras .

So what is it about? The recycling line processes mixed plastic waste, for example from yellow and black containers. He crushes, grinds and heats the plastics to a temperature of four hundred degrees Celsius, at which the substances from which the plastic was made gradually evaporate from the plastic. After being cleaned through several chemical and mechanical filters, products that are similar in composition to gasoline, diesel, gas and industrial wax leave the line. In simple terms, it can be said that this is the opposite technological procedure as in the production of plastics from oil - the line produces "oil" from plastic.

Recycled products can be used as



fuel or as a raw material for the petrochemical industry, for example for the re-production of plastics.

"What is unique about our technology is its design solution. The competition builds large complexes that are built on tens of thousands of tons of waste. When processing such a quantity, it is very difficult to maintain the chemical processes at optimal temperatures and pressures - imagine, for example, cooking soup in one pot for ten people or in a huge cauldron for ten to a thousand people," Daniška explains. With giant lines, it is also difficult to ensure that their start-up and operation do not consume more fossils than are saved by recycling plastic.

The Slovak designers plan to supply the technological line in a boxed "plug-n-play" version, so that it fits into four standardized shipping containers. "How much waste you plan to process, how many containers you order," adds Daniška. According to him, the technology is also energy-saving thanks to the fact that after start-up it uses process gas for heating, which is produced by the decomposition of recycled plastics, and is burned in low-emission and energy-saving ceramic infrared heaters.

#### Technology for export

They plan to deliver the plastic recycling line in a plug-n-play boxed version. It fits into four standardized shipping containers.

## THEY MAKE FUEL FROM PLASTIC

Another competitive advantage, which the team around Daniška has worked towards after years of fine-tuning the technology, is the purity of recycling.

"The line can convert a very diverse plastic waste back into hydrocarbons, but in order to achieve the maximum purity of the output fuel and gas, we only process waste that is sorted and contains at least eighty percent of polyethylene and polypropylene," says Daniška.

These are the two most used plastics worldwide, and in Slovakia, after the introduction of backup, PET bottles make up on average more than three quarters of the contents of yellow containers.

Crushed and ground plastic waste travels to a reactor - a furnace in which a process similar to the distillation of alcohol in a distillery takes place without access to air. "Hydrocarbons are released, which we repeatedly filter and remove impurities and toxic substances, so that the output fuel meets the fuel quality requirements according to Slovak legislation," he added.

According to Daniško, the gas produced in the line during the decomposition of plastics is equally clean. "Current technology has allowed us to clean it to the level of natural gas, and we are also from processing

they excluded some types of plastic such as PET bottles, which have a high oxygen content and PVC, which has a high chlorine content," says Daniška. Outputs from the facility and the content of impurities in them are monitored by the VUCHT research institute operating at Slovnafta. He also has a contract with Eurex Energy for the collection of the liquid fraction of the recyclate.

At the end of October, the promising technology received an EIA permit from the authorities that assessed its impact on the environment. The latest version of the line, which recycles food film residues from the production of Chemosvit, has permission from the authorities for experimental verification of the technology in the scope of processing 1250 tons of waste per year.

"It's a breakthrough, we don't yet know of anyone in the world who has such a technology, and we would be happy to get it onto the market as soon as possible. Not only Slovak, but especially global," says Siemens control systems specialist Marián Filka. The Slovak branch of the multinational concern supplies the digital control center of the line. The product of the Slovak constructors impressed even the highest places of the concern. Werner Schöfberger, head of Siemens' process automation department for Central and Eastern Europe, came to Svi-tu to look at the line, negotiations are currently underway on further business development.

According to Siemens, the advantage of the line is that it gives industry or municipalities the opportunity to recycle plastic waste in a decentralized and independent manner. Thanks to the ease of assembly and transportation, basically every city, collection yard or industrial enterprise can build one or more units for processing plastic waste on their premises - depending on the amount of waste. "We would perceive the expansion of this technology as a great contribution of our society to the fight against climate change and building a carbon-free economy," added Filka.

## BARRIERS AND OBSTACLES

The key battle for whether and how quickly the Slovak unique product will take off on foreign markets is currently being fought at the level of authorities and legislation. The transformation of plastics into fuel, which is supported by Eurex Energy, Chemosvit and Siemens, is based on chemical recycling. This technology has a bad reputation in the world from the point of view of safety, because several operations have burned down, and also from the point of view of energy demand and the variable quality of the recyclate, which changes according to the variety and pollution of the used plastic waste.

"Plastic waste is flooding us and it is necessary

It is not possible to devote intensive attention to its processing, but the technology of chemical recycling is not yet established from the point of view of the authorities and regulation," says Cyril Burda, who directs the Center for the best available techniques at the Ministry of the Environment. He is also a member of the working group of the European Commission, which was established three years ago to prepare the gradual inclusion of this technology in European legislation. "One of the most serious problems on which we agree in the group is that the technology does not produce a stable, homogeneous output and is therefore not suitable for processing mixed municipal waste," says Burda.

Officials or activists who evaluated the technological line of Slovak designers also objected with concerns about air cleanliness and the fact that the output of chemical recycling should primarily be pyrolysis oil, which will then be purified and only then can it be used as a raw material for the petrochemical industry and plastics production. "If someone declares that they recycle plastics into pyrolysis oil and pyrolysis gas, which are intended for energy recovery, then from the point of view of the current legislation, it is not recycling, but incineration of waste," says Monika Medovičová, former environmental inspector environment and an expert of the non-profit Priatel'ia Zeme - SPZ.

"Chemical recycling, specifically pyrolysis, is not a new technology, but our line has solved most of the problems with which this technology has struggled so far," emphasizes Daniška.

According to him, the results and measurements of the line's outputs demonstrate the long-term safety, economic profitability and sustainability of its operation. According to him, Slovak technology is an opportunity for many companies and institutions to reduce their carbon footprint.

"Clients, especially multinational ones, pressured us as a film manufacturer to use as much recycled plastic as possible in production, that's why we started buying recyclate from large chemical companies like Borealis, which also go in the direction of chemical recycling," says the vice president of presta - of the Chemosvit group Martin Ťach. "When I found out that similar technology is being developed by Slovak engineers and we can even supply them with mechanical and electrical parts, operate them on our campus and process our waste, we thought it was an ideal combination," he added.

va. 

  
EXIMBANKA SR

SERIES ABOUT SUCCESSFUL SLOVAK  
OF COMPANIES THAT DO BUSINESS  
ABROAD, BROUGHT BY A PARTNER  
EXIMBANK