

The air quality control program for 2020, with the approval of the Ministry, was applied by 21 (27.3%) of the 77 LSGs that took part in the survey (covering 62.1% of the population). It is realistic to expect that there are more AQ monitoring activities and that the percentage of the population covered is slightly higher. This is because the procedure for obtaining Ministry approval for the program usually take some time, as well as because there is also a multi-year local AQ monitoring program.

In more than half of the LSGs, there are measuring points where AQ monitoring is performed or has been performed. In 70 % of cases, LSGs have more than 5 years of experience with AQ monitoring. The number of measuring points ranges from 1 to more than 15 (Belgrade). The most common number of measuring points is 1 to 5, in 71 % of local self-government units, and then 6 – 10 in about 22 % of local self-government units.

Local AQ monitoring programs mainly deal with the non-reference methods, common pollutants and partly specific pollutants. According to the existing regulations, the results of measurements by non-reference methods are acceptable only with the appropriate equivalence test with reference methods. These are most often SO₂, NO₂, soot and total suspended matter with heavy metal analysis (TDM with HM) and more recently PM₁₀ with or without heavy metal analysis - PM₁₀ HM. Measurements of PM₁₀, PM₁₀ HM are expensive, both due to the operational cost and due to the need to fulfil the required conditions for accreditation. In many local programs, such measurements are not carried out every day, therefore having a character of indicative measurements.

Depending on the air emissions impacting an area covered by the local AQ monitoring plan, the specific pollutants measured also include: NH₃, TNMHC, BaP, polycyclic aromatic hydrocarbons (PAH) in PM₁₀, BTX and PM₁₀ analysis on mercury content. The monitoring of allergenic pollen, which can be considered to be a unique natural pollutant, is also mentioned.

Implementation of the local AQ monitoring program, in accordance with the applicable regulations is conducted or has been conducted in 40 of the 77 LSGs and is assigned to interested legal entities through tender within the public procurement procedure. In most cases, the realisation of AQ monitoring is awarded to the local Public Health Institutes (PHI) (26 of 40 LSGs, or 65 % of LSGs that have local monitoring).

THE WORN TYRES PYROLYSIS' SOLID PRODUCTS OPPORTUNITY APPLICATION AS FUEL SUBSTITUTE ASSESSMENT

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One of the most common methods of utilization of rubber waste is pyrolysis. As a result, it always comes out three products: gas (about 12 %), liquid (35 – 52 %) and solid carbon product – char (about 36 %). The relation between the products of

pyrolysis depends on many factors. The opinions of scientists on the utilization of pyrolysis products are controversial. It is believed that the most valuable products is the pyrolysis oil that may be usable as a raw material for motor fuels and valuable hydrocarbons. There are known examples of the utilization of pyrolysis oil as fuel for boiler installations. The mixture of waste oil and pyrolysis oil is proposed to be used as fuel in boiler units. The solid product-char can be used as adsorbents and fillers in the manufacture of rubber and other mixtures.

Another point of view is held by scientists, who point out essential differences in properties of pyrolysis oil, pyrolysis char and ordinary fuels, which does not allow using it as a succedaneum fuel. Pyrolysis char is essentially low quality. It can't be used as a substitute of carbon in rubber mixtures without appropriate treatment. According to ETRMA report, the economic viability of pyrolysis is hampered by the fact, that the prices obtained for the by-products, often fail to justify the process costs.

Thus, the method of tyre recycling by pyrolysis has its advantages and disadvantages. The advantages of the method include: low power consumption; the ability of any tyres recycling and the nature reserve of fossil fuels. The disadvantages of the method are: low-quality products that greatly limit its practical use and specific, unpleasant smell, which liquid pyrolysis products have.

Recently, the relation to the process of pyrolysis of worn tyres is changing. The development of modern technologies contributes to the improvement of pyrolysis products quality. Therefore, a number of companies in the world are developing and exploiting new technologies of worn tyres pyrolysis. The tyre recycling industry in the USA is among the strongest and most spread worldwide. According to the U.S. Environmental Protection Agency (EPA) pyrolysis of scrap tyres offers an environmentally attractive and cost-effective method for transforming of the waste tyres into useful products, heat and electrical energy.

Significant successes in this way were achieved by American firms Pyrolyx USA which plans to build the largest plant in the world and Delta-Energy Group whose DEPolymerization process produces two different lines, Phoenix Black and Zephyr Black. In addition, the technology of worn tyres pyrolysis is actively developing in Poland, where new types of pyrolysis reactors are proposed.

Chinese manufacturers affirm that they produce diesel fuel from liquid pyrolysis products with no unpleasant odor. The fuel for boiler installations generated at Chinese manufactures meets the European standards. According to this firms sell their equipment to 34 countries of the world.

In view of the above, we decided to test the possibility of using pyrolysis char in the Ukrainian industry.

Urgent research is devoted to the method of pyrolysis. In our opinion, the pyrolysis of tyres carried out using modern technologies can provide the Ukrainian industry with valuable alternative fuel. We want to develop an alternative fuel from end of life tyres (ELT). In our opinion, the benefits of tyre recycling and creation alternative fuel are: recycling of tyres will help to protect the environment from tyres landfills; raw material (coil and oil) can be saved and partly replaced with products from the pyrolysis of tyres; we offer to produce alternative fuel from waste without use of food raw materials.

The purpose of the research is to define the factors that provide the application of solid pyrolysis products received from the ELT as alternative fuel. To achieve this purpose it was necessary to decide the following tasks:

- estimate the environmental performance of pyrolysis char; to evince that using of the char will not reduce the calorific value of fuel;
- present that the use of the char will not increase the emission of toxic substances; to find a way how to use the tyre pyrolysis char for partial replacement of coal in power plants;

In the United States the standardization of recycled carbon black (pyrolysis char) is soon going to be implemented in industry. American Society for Testing and Materials (ASTM) has introduced opening of the committee which will develop standards for the pyrolysis char in 2017. The goal of the ASTM's new committee (D36) will be to establish and update standards in ELT and scrap rubber decomposition, standards in material characteristics and sustainability.

According to EuroEco Fuels they are building a state of the art facility and their conversion technology produces petrochemicals and fuels from wastes, for example carbon filler and coal for energy generation.

At the Department of Ecology of Kharkiv State Automobile Highway University in Ukraine, we decided to evaluate the possibility of using the tyre pyrolysis products in the industry of Ukraine. We analyzed the compliance with the standard requirements for adsorbents of pyrolysis char and samples of typical П234 and П803 adsorbents. According to the results our research, the pyrolysis char cannot be used as a substitute of carbon in rubber mixtures without appropriate treatment. Thus, the basic characteristics of pyrolysis char are than 2-2,5 times less than carbon standard samples. The char has a sorption capacity, indicating the possibility of using it as a sorbent, but only after additional activation. For example, the ash content in the pyrolysis char is 7,7 – 16 % and for standard samples – 0,45 %. The specific geometric surface is 39-43m²/g, and in standard samples of 50 – 100m²/g. The sorption capacity of char is significantly lower than that of activated carbon used as the adsorbent according to our knowledge and to the dates of.

In the next stage of our work, we investigated the possibilities of using the pyrolyses char as fuel for industrial energy plants. The necessity to reduce the total cost of fuel by its partial replacement from wastes is a major incentive to find cheap alternative fuel for energy plants. To use the char as a fuel it was necessary to show that the environmental marks of the char, at least, are not worse than those of coal. For this purpose, we investigated the chemical composition of the ash and gases, which are formed during char combustion. The ash content in the char is less than coal of anthracite, so the partial replacement of coal char reduces emissions of toxic components.

The emission of sulfur does not increase and heat of combustion is not reduced, and in some cases even increased. The water content of the char does not exceed its content in coal. The moisture content of char does not exceed its content in coal. The content of the main combustible components – carbon and hydrogen in char practically does not differ from coal. According to these results, we came to the conclusion that char can be used as a substitute for coal.

Recently thermal power stations are co-incinerating coal increasingly with wood pellets in Europe and North America. Especially widely such fuel mixtures are used in USA, Great Britain, Netherland, Poland and Spain.

The main advantage of co-incineration is the possibility to use existing coal combustion equipment. It provides the lowest capital costs compared with the construction of new boiler units. Such technology allows to utilize a significant amount of biomass, partially replace fossil fuels and reducing emissions of nitrogen oxides and sulfur oxides.

Among the varieties of technology for co-incineration of coal and biomass, flaring combustion systems was the most widespread. The distribution of this technology was obtained in the United States, Great Britain and Finland. There are two main principles of using industrial pellets for energy production: burning only pellets as fuel or burning the mixture of pellets and coal.

The current issue for Ukraine is the replacement of natural gas by coal. Indeed, an essential economic effect with such kind of replacement will be received when using cheap fuel. Low-reaction (anthracite and brown coal), or low-quality (high-ash and fine fractional) coal can be used in Ukraine as actually interesting. Deposits of such coal are located in various regions of Ukraine.

In modern economic conditions, Ukraine does not have an opportunity to equip small and medium power plants with cost effective and environmentally sound manner equipment. Coal which is used in Ukraine has high ash content, which can reach 40 %. This results in significant emissions of solid particles and sulfur oxides. Pellets have very low ash and sulfur content.

So the use of such mixtures will reduce emissions of solid particles and sulfur oxides into the atmosphere using the existing in Ukraine equipment even with highly ash coal. However, pellets have significantly lower heat of combustion than coal. Taking into account the properties of pellets and pyrolysis char of ELT, we decided to propose to apply them in a coal-pellets-ELT char triple mixture.

Our suggestion is to produce alternative fuel from wastes without using food raw materials. In our opinion, the pyrolysis technology can become one of the most attractive ways of tyres utilization not only in Ukraine but in other countries as well.

In our opinion, the technique of pyrolysis can become one of the most attractive ways of tyres utilization for Ukraine and not only for Ukraine.

CLIMATE CHANGE IN ARGENTINA

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Argentina has an area of almost 3 million km² and extends from 22°S to 55°S and from 75°W to 55°W, in other words, from the subtropic to the subpolar region. The eastern portion of the country is essentially plain, rising gradually from east to west. On the western side of the country there are the Andes mountain range, the most important topographic feature in South America. Mountains in Argentina have