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Sources of financing technologies for monitoring and purifying atmospheric air (for example, the city of Mariupol)

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SUMMARY

The search for funding sources for improving the technologies for monitoring and purifying atmospheric air, including closed low-waste ones, is a topical research topic. A closed low-waste technology for utilization of dust and other harmful substances during the operation and repair of equipment of metallurgical enterprises in Mariupol is presented, which complies with international standards and the law of Ukraine "On Waste". Disposal of dust and other harmful substances is carried out in accordance with sanitary rules, the order of accumulation, setting the maximum amount and organizing the logistics of their transportation. Closed low-waste technology is aimed at monitoring, cleaning, filtering and neutralizing elements of harmful substances, dust, welding aerosols (WA). The sanitary and hygienic conditions of the operating metallurgical enterprises and the population of Mariupol have been significantly improved. Dusty waste containing expensive alloying elements in the solid component (SC) and in the gaseous component (GC) are briquetted into granules, bags, which are reused in metallurgy. To accelerate the implementation of the proposed closed low-waste technology, the authors investigated and proposed to introduce a methodology aimed at optimizing funding sources, including a certain set of borrowed, own, credit and indirect funding sources.

Introduction

The present filter ventilation systems do not sufficiently purify the atmospheric air, waste disposal, they are not closed filter ventilation systems. It is necessary to develop a closed system for monitoring and purifying air without emitting into the atmosphere, trapping dust, harmful substances, welding aerosols, while not harming metallurgical processes. Foreign counterparts are based on filtration, ventilation and air emissions of SC and GC, which does not meet international requirements according to the Kyoto and Paris protocols. The proposed technology for monitoring and purifying atmospheric air uses Ukrainian equipment and materials (Levchenko, 2006; Chigarev, 2001). Waste disposal complies with the Law of Ukraine "On Waste" (Law, 187/98), as well as sanitary regulations No. 3209, which establish the maximum amount of toxic waste accumulation on the territory of the enterprise, and No. 3183, which regulate the procedure for accumulation, transportation and disposal of toxic industrial waste. A technology for briquetting a metal package has been proposed. Briquetted metal-package contains up to 65-68% of alloyed and rare-earth metals, which are reused in metallurgical processing.The authors also proposed a dust classification for waste disposal. In this research the calculations were carried out according to the method (Logvinov, 1998; Kataiev, 2003).

Materials and research methods

As a result of the study, the design of a closed filtration and ventilation system (CFVS) was proposed. As a result of the research, patents were obtained (Patent, 19867; Patent, 101; Patent, 86222), presented in references. For monitoring and purification of atmospheric air, the following classification of emissions into the atmosphere (AE) is proposed:

$$AE \subseteq \{ D, F, S \}, \quad (1)$$

where D - dust classification by origin; F - classification by the method of formation; S - classification by particle size.

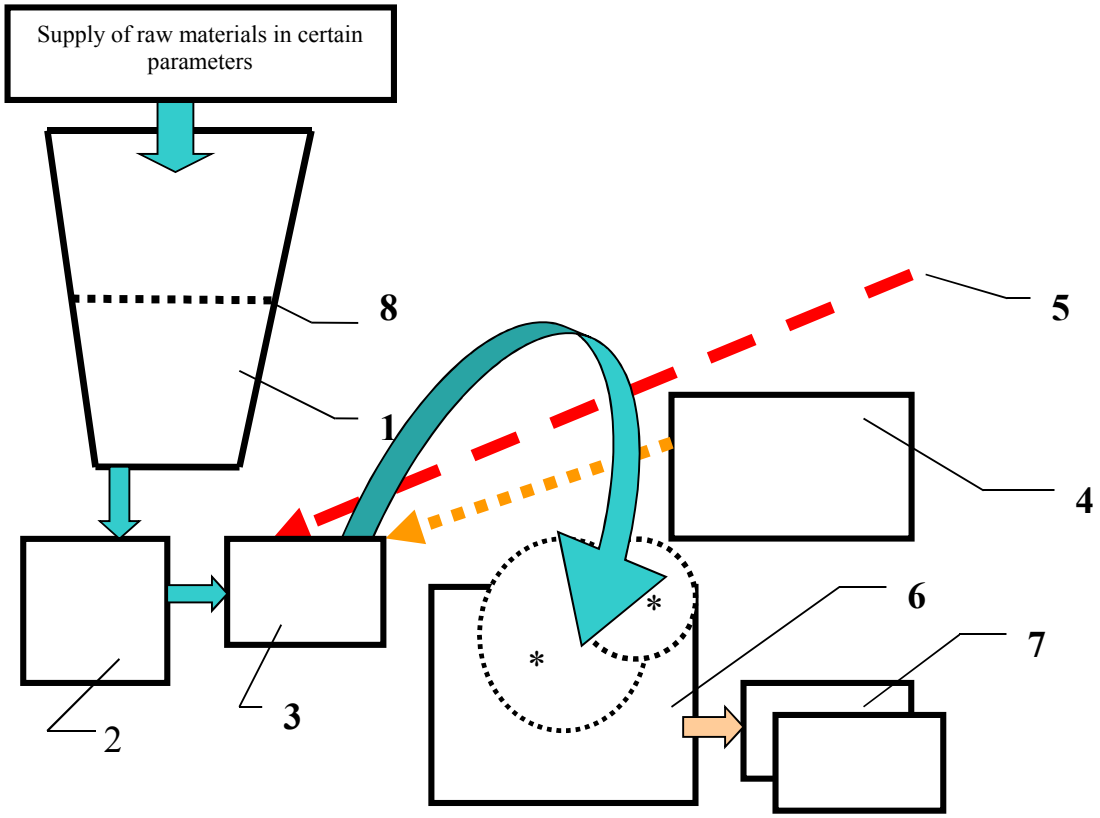
By the origin dust (D) is divided into: organic (DO) - can be natural, animal, and plant origin; artificial dust (DA) - from plastics, rubber, resins and other synthetic products; inorganic (DI) - mineral nature of origin, quartz, cement; metal dust (DM) - ferrous and non-ferrous metallurgy; mixed dust (DX). Taking into account the above, we represent (1) in the form of a set:

$$D \subseteq \{ DO, DA, DI, DM, DX \}, \quad (2)$$

The proposed technology includes the following stages: monitoring and cleaning of atmospheric air from dust, SC, GC and other waste; preparation for briquetting, sieving and obtaining homogeneity of substances; mixing with adhesive (specially elaborated); briquetting on a rotary press to determine the technology and modes; packing briquettes in accordance with international requirements (in bigbens); transfer of briquettes to the blast furnace shop and other industries. An enlarged scheme of a briquetted metal package according to low-waste technologies is shown in Fig. 1.

Waste from a closed filtration and ventilation system (CFVS) is dusty waste of various sizes, fed into the bunker-1 from containers, plates and 3 filters. There, dusty waste is cleaned of impurities and other admixtures. Grind inclusions in dust. Further to the mixer-3, the elements are glued together –4. Legnin and other emulsions are used as an adhesive. In our case, the gluing elements are from oil products. This process takes place at a certain temperature and humidity. In the enlarged scheme, this is a container with an emulsion of oil products - 5. Before the mixer, raw materials are fed into a rotary press - 6. Further, the elements of a rotary press, at certain technological parameters, produce briquetted granules and they are installed in a plastic bag in an installation - 7, 8 - mechanical sieve.

Moreover, the package must be strong enough suitable for transportation and long-term storage. Packages are formed in bigbens. In general, the proposed technology for monitoring and purifying atmospheric air is protected by patents and its use in other production is possible.



Designation: 1 - bunker; 2- chopper; 3- mixer; 4- container for gluing elements; 5- container for a specially designed emulsion; 6- rotary press (operating in certain modes and technologies); 7- installation for briquetting a metal package. 8-mechanical sieve.

Figure 1 *Enlarged scheme of a briquetted metal package according to the requirements of low-waste technologies.*

Formation of optimal financing for the development of a closed low-waste technology for monitoring and purifying atmospheric air should be carried out by taking into account the following aspects:
a) identifying possible sources of financing from the following: own, borrowed, indirect payments; change in the shares of local and national taxes remaining in the local budget (environmental tax - 100% of total fees, tax on personal income - 75%, property tax -75%); b) implementation of additional financing of small and medium-sized businesses - subjects management involved in the technology of monitoring and purification of atmospheric air in the districts of the city of Mariupol; c) selection of a leasing scheme for the purchase or lease of equipment for monitoring and purification of atmospheric air; d) study of the possibility of replicating the technology of monitoring and purification of atmospheric air in other industries; e) financing of additional personnel training and professional development; f) funding for further research to improve the technology for monitoring and purifying atmospheric air.

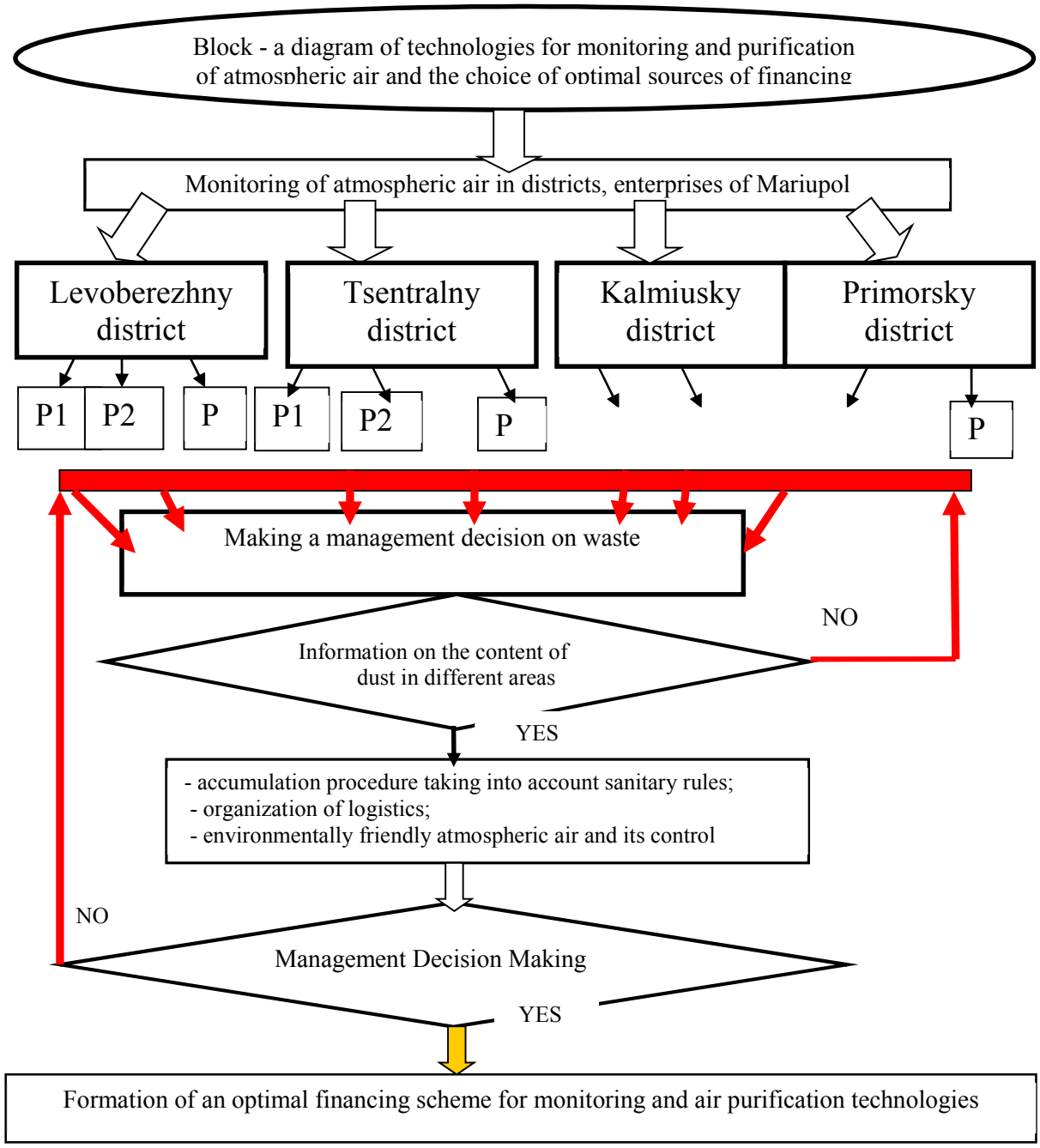


Figure 2 *An enlarged block diagram of monitoring and purification of atmospheric air and the choice of the optimal financing scheme, taking into account further improvement (on the example of Mariupol).*

Conclusions and suggestions.

The sources of financing for the development of technologies for monitoring and purifying atmospheric air and metallurgical production wastes have been investigated. The scheme of the process of "briquetting" of metal packaging in accordance with the requirements of low-waste technologies is proposed. An enlarged block diagram of monitoring and purification of atmospheric air and the choice of the optimal financing scheme, taking into account the revision (by the example

of Mariupol), has been formed. The methodology of financing the development, testing of a closed technology for monitoring and purifying atmospheric air and processing metallurgical waste is presented. Indirect sources of financing the development of monitoring technologies, air purification, processing of metallurgical production wastes have been identified, including through: reduction of the profit tax rate; formation of an optimal capital structure aimed at increasing the return on equity capital through the mechanism of financial leverage; changes in the Tax Code of Ukraine should be aimed at increasing the share of transfers to local budgets for the following local and national taxes, fees and charges: income tax; personal income tax; excise taxes; property tax; personal income tax; environmental tax.

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