”Pro-ecological pilot installation for bituminous emulsions production, modified with polymers waste nanostructures”

AFTER LIFE COMMUNICATION PLAN

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Projekt LIFE EMU NEW - LIFE14 ENV/PL/000370 pn. „Proekologiczna instalacja pilotażowa do produkcji emulsji asfaltowych modyfikowanych nanostrukturami z polimerów odpadowych” jest współfinansowany ze środków Komisji Europejskiej w ramach Instrumentu Finansowego LIFE oraz ze środków Narodowego Funduszu Ochrony Środowiska i Gospodarki Wodnej.

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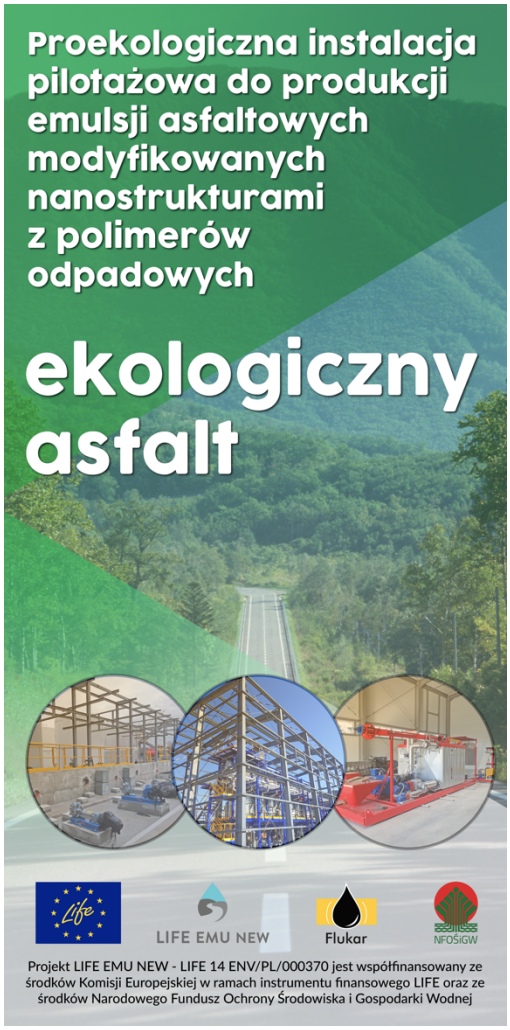
Summary

The aim of this study is to set out an action plan after the completion of the project in order to maintain its objectives and achieve even more effective results. Activities include:

- monitoring of subsequent tests of the pilot line, including the selection of raw materials (polymer, asphalt, etc.) in order to optimise costs, increase the environmental effect, maintain the best quality parameters;
- continuous monitoring of the products obtained - qualitative tests;
- economic analysis of the extension of the polymer processing with a line for independent processing of plastic waste (segregation, crushing, milling), which will allow better and more effective selection of this type of raw material;
- monitoring the market associated with making decisions regarding the commercialisation of products manufactured at the pilot line (asphalt/asphalt emulsion modified with waste polymer);
- in the case of decisions on commercialisation - developing an investment strategy (construction of a production line, obtaining the necessary certificates of approval for market entry);
- continuous work on the use of the pilot line as part of the idea for the used oil Plant in Kędzierzyn Koźle (as a component of the whole mechanism forming part of a closed-loop economy);
- linking the effects (products) of the project financed under the LIFE instrument with the results of the project financed under the Operational Programme Intelligent Development 2014-2020 entitled: Implementation of the technology of selective management of hydrocarbon streams and recycling of waste of petroleum origin by using products obtained from the LIFE installation during the process of recycling hazardous waste (used oils). Thanks to this, the company will obtain an additional financial effect (extension of the value of the product obtained in the project), broaden its product portfolio, and strengthen the environmental effect;
- continued dissemination of information about the implemented project and its results - especially in social media, during presentations at conferences, and individual meetings with business partners;

- promotion of the idea of waste management as part of marketing activities of Flukar Sp. z o. o;



- works on changing the image of the company from a lubricant producer to an entity investing in ecology, pro-environmental, a recycler focusing on the secondary use of polymers, petroleum and chemical waste;
- intensification of activities already implemented – aimed at building environmental awareness through, among others, training of employees in the field of ecological technologies, visits to installations combined with sightseeing and training addressed to the company's contractors, employees and owners of workshops and car services, students of technical and vocational schools as well as technical universities.

The document presents specific actions of people in specific positions in the company, specific departments of the company and deadlines for their implementation.

The tasks indicated in this plan must be closely related to the company's activity in the scope of the whole Plant in Kędzierzyn Koźle, where further work will be carried out in relation to the pilot installation, as well as other activities aimed at ensuring the most effective use of waste and a number of R&D works enabling further development of the company in the scope of developing new technologies based on closed-loop economy and waste management.

Description and objectives of the action taken

1. Information about the project

A pro-ecological pilot installation for the production of asphalt emulsions modified with nanostructures from waste polymers is implemented by FLUKAR Sp. z o.o. based on research conducted for years and its own innovative technology from 2015.

The innovativeness of the developed technology consists in the use of waste polymers and mineral nanofillers for the production of modified asphalt and the production of bitumen emulsions modified with nanostructures made of polymers. The main activity of the project was to build a pilot installation and to perform tests according to the developed concept.

1.1 The course of project implementation

In the Q3 2019, the pilot installation was ready to perform tests, so raw materials were ordered and further tests were carried out.

The process of selection of raw materials, in particular asphalt and waste polymer was associated with a number of laboratory tests - performed by the of Flukar Sp. z o. o. laboratory and an external laboratory.

Information and promotion activities concerning the project were carried out throughout the project implementation period. It should be noted, however, that the second half of 2019 allowed for the intensification of factual discussions on the project products and results.

1.2 Conclusions from the conducted tests

In view of the results of the performed tests, it has been established that:

- the pilot installation enables the production of waste polymer modified asphalt;

- in order to ensure the maintenance of the installation as well as the quality of the final product – the quality of the waste polymer must be observed during the

selection process - and thus the raw material must be properly prepared and have the right chemical composition;

- the use of nanostructures, although possible, did not allow (as previously expected) to achieve much better asphalt quality parameters;

- at the time of project completion, the results confirm that the obtained modified asphalt emulsions meet the requirements and expected parameters.

The pilot installation has no production capacity, and thus the possibility and economic viability of commercialization of the technology under study was considered. First of all, resources should be invested in the creation of the production installation, and secondly, there should be certainty of gaining a permanent market for the ecological product.

The main final recipients of the product in the form of asphalt or asphalt emulsions are local and governmental units implementing road investments or obliged to repair roads left under their management.

At this point in time, the Polish legislation is governed by the Public Procurement Law, which, of course, allows for the introduction of additional criteria to the Specification of Essential Terms and Conditions of Procurement (TORs), e.g. the products used in the investment are to derive from waste in some percentage, etc. However, the boards of local governments and state institutions most often decide to choose the cheapest offer after meeting the basic quality parameters. Thus, the product obtained thanks to the completed project at this point in time does not show signs of economic viability or competitive advantage as the cost of the purchase of asphalt, its modification (including the purchase of properly prepared waste polymer, launching the nanospider) will be on average at least a few percent higher than the cost of purchasing standard asphalt..

1.3 Communication activities

The project included executing a number of activities aimed at disseminating ideas related to environmental protection, and in particular waste reuse. The activities were focused on several parallel and interlinked campaigns.

For all information and promotion activities, a creative line and a graphic key for the whole project were developed, which is in principle still used today.

Educational campaign - within the framework of which a number of activities ensuring the greatest knowledge about the project and the used technology was organised. Due to the nature of the project (degree of complexity of the technology), this campaign was primarily addressed to:

- contractors, installation subcontractors
- raw material suppliers
- the company's employees - production, marketing and sales representatives
- members of the project team and the consultative committee
- the company's existing customers
- the inhabitants of Kędzierzyn Koźle.

The most frequent activities include **e-mail communication as well as working and official meetings** of the project team members with representatives of the above mentioned groups, and among themselves. This communication ensured the exchange of information, including familiarization with the technical documentation of the installation, as well as discussions on the next steps within the project, decisions to perform further tests and/or select the raw material.

Another invaluable tool turned out to be **demonstration workshops** held in the final six months of the project. People from the industry – technology suppliers, representatives of engineering companies, as well as people completely unrelated to the industry – were invited to the workshops. Thanks to this, the workshops were very diverse in terms of their content. Both the language of speech and the amount of knowledge were adjusted to the recipient sitting in the hall.

Thanks to the location of the pilot installation close to the Research and Development Centre, the workshops could take place in three stages:

1. information meeting in the R&D Conference Room

2. demonstration of the installation in the hall
3. visit to the laboratory (asphalt testing laboratory) combined with a discussion on the parameters of raw materials in relation to the expected quality parameters of final products – possible to achieve at the installation.

Workshop participants were encouraged to pass on information materials to outsiders as well as to visit www.emunew.pl and the EMU NEW social media profile.

Another educational activity was the development and placement of boards in the hall showing the scheme of the pilot line, as well as marking the elements of the line with information regarding project co-financing. The diagrams facilitate the conduct of workshops – especially for people with little industry knowledge.

Information campaign - implemented largely by the specialist Grzegorz Nieradka, which ensured a good level of content, as well as the appropriate quality of the presentation itself.

Intersectoral debates and information meetings were an important form of this campaign. Thanks to the exchange of experience and information on world-known technologies using waste to improve other products, the participants' awareness of the direction in which the world is currently heading increased. The Zero Waste lifestyle, as well as the idea of recycling, is becoming more and more widely comprehended by ordinary people. Due to the nature of the project, it was not possible to organise individual debates for the originally planned number of participants, because in order to be able to talk about the problems of the project in a concrete manner and on a high level of substance, it was necessary to focus on engaging in events that had been known for years, which guaranteed the presence of people with the appropriate reputation and knowledge. A much better solution (more effective in terms of the ratio of expected result to costs) was the presentation of the project idea at events already organised.

Dissemination campaign - implemented mainly via website and social media, as well as through all kinds of information materials – leaflets, folders

and promotional gadgets distributed at various events in which Flukar Sp. z o. o. participated – on the occasion of promoting other activities of the company.

Due to the changes in awareness, social media proved to be the most effective medium for conveying news and content.

The project also included making a documentary film, in a slightly different dimension than originally planned (much shorter). The content and form have been adapted to the widest audience - that is, laymen, who will not necessarily want to spend more time reading longer statements or watching a long film with very detailed, technical and incomprehensible terms.

After conversations with marketing and advertising specialists – a film lasting less than 5 minutes was created, thanks to which the viewers are not bored, and the documentary also works well at fairs or workshops. The film was uploaded on Youtube.com on the EMU NEW channel in both languages, then the link to the video was distributed through various channels among distributors, customers, employees, etc.

In the case of a decision to introduce to permanent sales and commercialise the results of the project, it will be necessary to carry out activities focused strictly on advertising and promotion of products created at the pilot installation - asphalt emulsions, asphalts.

1.4 Situation analysis (SWOT analysis)

Strengths	Weaknesses
Recycling issues are of interest to potential customers	The complexity of the issue makes it less interesting to provide more detailed information In the imagination of the potential recipient, polymers are pet bottles – that's why they expect the installation to process these bottles The product created from the use of waste is not directly connected with everyday life, which causes less interest in the product itself
Use of waste polymers	Necessary to find a supplier who will supply the raw material prepared to work in the installation (without contaminants that could damage the equipment), fusible at the temperature at which the installation works
The asphalt obtained from the installation meets the quality parameters allowing it to be used in the road construction industry	The cost of obtaining modified asphalt is higher than that of standard asphalt No eco requirements in public entity tenders (main recipients are entities obliged to apply the Public Procurement Law)
Possibility of organising meetings/debates in the place of project implementation	Poor interest in visits to Kędzierzyn by industry specialists, no time for additional visits
Net working as an opportunity to build lasting contacts between LIFE beneficiaries	Lack of projects typically dedicated to road technologies or even in the chemical industry
The website and graphic line created for the project as an opportunity to promote and disseminate the results	More frequent use of social media, which encourages to focus on this medium as one for the transmission of content, less need for updating the website
Participation in fairs allowing meetings with other companies – suppliers of installations, raw materials, etc.	Increasingly smaller number of visitors to trade fairs, smaller share of specialists, high cost venture
Participation in events with an achieved reputation guaranteeing the presence of world-famous specialists	Lack of implementation of tasks in the project assumed as the organisation of own events due to the low efficiency of these events

Analysing the ways of reaching different groups of recipients in the course of project implementation, decisions were often made to reformulate the way the project or company was presented.

The cost of organising events on their own (the cost of space, catering, service, etc.), as well as the need for guests to find additional time in tight schedules (especially in relation to specialists, whose presence would be most important for the company) were decisive for involving less capital in this type of activities. On the other hand, participation in national and international events that are already well known in the industry has been increased, with the participation of specialists or the most influential suppliers of raw materials or installations.

During speeches at conferences and backstage meetings many people from different groups were introduced to the project.

2. Further activities within the project

At the moment of project completion, the project team together with the Management Board decided to suspend the decision concerning the commercialisation of products obtained by using the tested pilot line technology. Further tests combined with R&D and laboratory tests will be performed. Production of emulsions on a smaller scale will be carried out according to demand.

Further activities will be focused around:

a) searching for, purchasing raw materials, conducting further tests on various raw materials, including further tests on the effective use of nanofibres, nanoemulsion without increasing the energy intensity of the process – person responsible: Deputy Head of the plant in consultation with the laboratory manager;

b) testing of obtained products, work on developing optimal quality parameters (according to market demand and in relation to raw material costs) – person responsible: laboratory manager;

c) observing the legal environment with regard to changes in the Public Procurement Law or other legislation forcing public institutions to change the criteria in tenders for the supply of asphalt and asphalt emulsions (ecological criteria etc.) – person responsible: specialist for tenders;

d) looking for an additional way of using the pilot installation (in case it is not used 100% for the its original purpose), including the nanospider in the activity of Flukar Sp. z o. o. Plant - in the scope of all activities related to closed-loop management as a complement to the installation for recycling of used oils and production from the obtained raw material - base oils, oils, greases, asphalt emulsions – persons responsible: Product Development Director, laboratory manager and head of the Plant;

e) further educational, information and dissemination activities focused on raising awareness and creating an attitude actively involving in pro-environmental activities, making daily choices in compliance with the idea of environmental protection -

segregation and management of waste, savings in the area of management of natural resources, limiting waste generation through daily consumer choices;
f) monitoring of the waste polymer indicators - based on purchase of raw material VAT invoices - with a capacity of 176 t/year – person responsible: Deputy Plant Manager.

Due to the conclusions from the previous activities in this area, the implementation of these objectives will include in particular - employees, persons directly cooperating - business partners, suppliers of raw materials, contractors. For reasons of effectiveness, the tools most frequently used during the project implementation will continue to be used for educational, information and dissemination purposes:

- participation in industry information meetings, debates and conferences (as participant and speaker) - including events related to the chemical industry, environmental protection, new technologies in waste management;

- workshops/trainings for employees, collaborators, product distributors, customers and other groups with whom Flukar Sp. z o. o. maintains business relations;

- information activities in the form of activities in social media and other marketing activities - publishing information about the plant's activities - in particular in the field of waste management, recycling, environmental protection;

- publishing on company profiles in social media interesting information on new technologies in the field of waste management.

The Product Development Director, the Marketing Department and the Management Board of the company will cooperate together towards the implementation of the above mentioned activities.

3. Monitoring of activities during the sustainability period

The following procedures have been established within the company in order to maintain all project-related sustainability requirements:

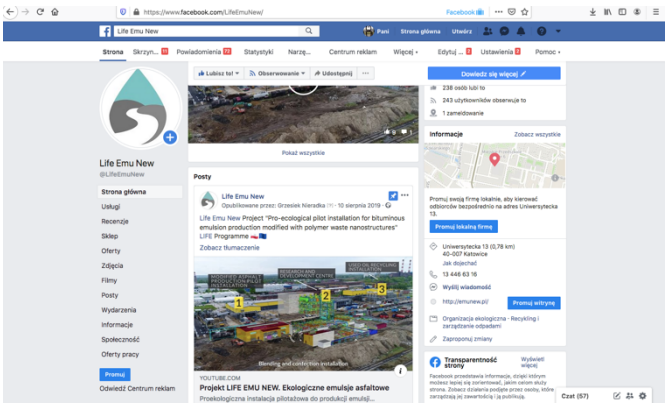
3.1 Safeguarding of durability in relation to fixed assets - appropriate marking of expenses in the accounting records, making the employees responsible for its operation aware of the need to maintain ownership of the pilot installation, and the production employees of the need to maintain consistency in the use of the pilot installation with the project objectives;

3.2 To inform the persons indicated in this document about the obligations related to the LIFE EMU NEW LIFE Project during its durability and their tasks in this respect;

3.3 Set cyclical (quarterly) dates for meetings between the Management Board and the persons designated for each activity - the meetings will discuss the activities executed during the period, and, their results. On this basis, the Board will decide on the possible commercialisation of the technology or the direction of its development, as well as a number of soft activities related to information and promotion of the project and its results.

3.4 To draw the attention of all employees who have been entrusted with the tasks indicated in this document to the need to ensure efficient communication among themselves and with the Management Board as well as with the institutions settling the project.

3.5 Evaluation of the method of operation after each completed year of sustainability - report on the operations in the areas indicated above.



4. Linking the project to other investments of Flukar Sp. z o. o.

In order to implement an innovative technology of selective management of hydrocarbon streams and recycling of petroleum waste on the market, Flukar Sp. z o. o. executed the following R&D projects concerning:

- Technology of selective management of hydrocarbon streams obtained from wastes of petroleum origin towards high quality components of lubricating oils (project executed in the period 1 June 2014 – 31 December 2015, co-financed under Measure 1.4 of the Operational Programme Innovative Economy 2007-2013 by the National Centre for Research and Development);
- Application of the demulsification process for purifying and dewatering of used oils in the raw material purification and dewatering unit which is an element of the installation for regeneration of used oils (research conducted from the company's own resources in the period July-September 2015).

In addition to the project concerning the modification of asphalt with waste polymer, the company has also carried out complementary projects - the above mentioned project is connected with waste of petroleum origin, and, from 2017 onwards, work began on the creation of a Research and Development Centre at the new Flukar plant in Kędzierzyn Koźle. The project entitled “Development of the research and development centre Flukar Sp. z o. o. performing research work for the petrochemical industry and waste management” was financed from the funds of the Operational Programme Innovative Economy 2014-2020. Thanks to the adaptation of the building and equipping the laboratory with labs dedicated to particular elements of the investment plan of Flukar Sp. z o. o. a base for laboratory tests necessary for the installation of asphalt modification and recycling of used oils was created, as well as for further R&D work, which the company intends to intensify.

In the years 2016-2017 – also from the Operational Programme Innovative Economy 2014-2020 – the company received support for two other investment projects, which are the result of previous R&D works, and these are the following investments:

- installation for recycling of used oil – project entitled: “Implementation of technology for selective management of hydrocarbon streams and recycling of petroleum waste”, completed by 30 June 2019 - currently at the start-up stage;
- blending and distillation installation – project entitled: “Implementation of technology for selective management and regeneration of solvent and petroleum waste streams” – planned start-up in January 2021.

Both projects are in line with pro-environmental concepts and waste management.

The process of cleaning used synthetic oils and preparations, by means of which the results of industrial research on the possibility of obtaining a synthetic base from used synthetic oils of a quality level allowing for its application in the production of finished products were confirmed.

The process of production of synthetic lubricants and oil specifics based on the obtained synthetic oil base and the obtained solvent fractions at earlier stages of the installation's operation will enable the finished product to enter the market.

It should be emphasized that in the course of development work on the evolution of the technology for selective management of petroleum waste, the company on its own executed R&D work on the application of the demulsification process for purifying and dewatering of used oils.

Taking into account the idea that by acquiring hazardous waste in the form of used oil from the market – the company ultimately intends to reduce the negative impact of this waste to a minimum – it will be transformed into a new oil base, lubricants, and the so-called vacuum residue will be used as part of a pilot installation for the production of bitumen modified with waste polymer (i.e. two waste components will be used in the production of the new product).

The above mentioned concept is a response to the demand for a closed-loop economy, the need for effective management of waste, particularly hazardous waste, and the need to eliminate the negative environmental impact by minimising waste unsuitable for further use.

The application of the 4R principle should also be indicated in all projects:

Reduce – refers to saving energy and reducing CO_2 emissions during the use phase of plastic products as well as reducing waste and losses;

Re-use - plastic products (waste) are reused;

Recycle - used products in two ways: mechanical processing into raw material for new products or conversion of plastic waste into chemical raw materials for new products (plastics or other),
Recover - means recovering energy by co-incinerating in appropriate energy production facilities or producing alternative fuels from waste, thus saving fossil energy resources.
It should be emphasized that during the implementation of any adaptation or construction works, during inquiries for the purchase of equipment - the company analyses and takes into account the saving and protection of natural resources.

At the same time, it is not the end of the implementation of ecological ideas in Flukar - the Management Board together with a group of employees is already analysing the ideas and initiating research and development works associated with concepts to develop products and technologies in such a way that they are as environmentally friendly as possible (low energy use, biodegradability, etc.). This proves that the implementation from 2015 of the project called "Pro-ecological pilot installation for the production of asphalt emulsions modified with nanostructures from waste polymers" has permanently changed the way of thinking of the Management Board and employees of Flukar Sp. z o. o. The company sees the greatest opportunities for development in waste management, as well as the creation of environmentally friendly products, although dedicated mainly to industry.

5. Summary and conclusions

The long-term and most important effect of the LIFE EMU NEW project completed by Flukar Sp. z o. o. is the change in the company's business profile – from a standard manufacturer of lubricants and oils - the company has become a company with its own R&D facilities – ongoing research, a company based on the idea of a closed-loop economy – thanks to other investments, it has been possible to maintain the company's original business profile (which guarantees a potential customer's market and experience in the production and sale of products) modified by an ecological factor,

thanks to which the company will not use natural resources, but will manage the waste, recycle it on many levels, including using a pilot installation.

At the same time, there has been a profound change in the awareness and the mentality of the Management Board, employees and business environment - Flukar Sp. z o. o. is a company caring for the environment, wanting to build its capital without harming the natural environment and, furthermore, facilitating its protection.

Appendix no. 1 - Plan of participation in external events