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Table of Contents

1. Executive Summary	3
2. Motivation for Pilot Innovation Environment	4
2.1 Background.....	4
2.2 Objectives	4
3. Short description of PIE.....	5
4. PIE achievements	5
4.1 Contribution to national strategy (related to FBI/FORESDA).....	6
4.2 Contribution to national/regional development and innovation potential	7
4.3 Contribution to the objectives of FORESDA.....	8
4.4 How does the pilot contribute to the Programme Priority “INNOVATIVE AND SOCIALLY RESPONSIBLE DANUBE REGION”?	8
4.5 How does the pilot fit into EUSDR?	8
5. Continuation of PIE	9

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1. EXECUTIVE SUMMARY

This document provides an overview of the work, the main idea and objectives of the Pilot entitled ‘Transfer of research results on the performance of wood and wood-based composites in outdoor applications into praxis’. It also describes the PIE achievements and its relation to the national strategy, to national/regional development and innovation potential, to the objectives of FORESDA, to the programme priority “innovative and socially responsible Danube region” and how the pilot fits into EUSDR. In the end the work after the end of Foresda project is presented.

2. MOTIVATION FOR PILOT INNOVATION ENVIRONMENT

2.1 BACKGROUND

Importance of wood as a building material has been increasing in the recent decades in most of Central Europe. In Slovenia, the interest in wooden products exposed outdoors, like children playgrounds, urban equipment, and garden furniture has increased as well. Service life of these products in the market is relatively short because of inadequate wood performance and construction, as for example water traps that eventually cause wood deterioration. Thus, the data on moisture content or colour changes of wooden objects exposed to different environmental conditions would enable the owners (private or public) to determine better the maintenance interval for their recoating or eventual replacement (safety).

The key issue of new innovative bio-based products for outdoor use is how to provide sufficient service life of such products. Long service life can be reached with proper selection of wood or other bio-based materials, appropriate product design avoiding water traps and good maintenance of the product. With increasing demands of such wooden products, we have noticed that these requirements are generally not met. This is a reason for premature failure of the products, which is reflected in a negative image of wooden or bio-based products for outdoor use, and consequently leads to replacement wood with other materials.

2.2 OBJECTIVES

- To design certain innovative products for children playgrounds (climber), urban equipment (benches) and high raised beds;
- To establish field tests for these products at the Department of Wood Science and Technology, Biotechnical Faculty, University of Ljubljana, Slovenia.
- To monitor moisture content of the exposed wooden products with special attention on critical details, such as; wood close to ground, connections, etc;

- To transfer knowledge of the applicative research results on the performance of wood and wood-based composites in outdoor applications into innovative products to relevant SMEs/ owners (private or public).

3. SHORT DESCRIPTION OF PIE

Implementation of Slovenian PIE was divided to four subtasks. The experiment was carried out on field test at the Department of Wood Science and Technology, Biotechnical Faculty, University of Ljubljana, Slovenia.

In the first task, three different products, i.e. children playgrounds (climber), urban equipment (benches) and high raised beds, were designed, prepared and exposed on the field test. After installation of the test products, wood moisture content (MC) and temperature (T) sensors were installed and monitoring was performed. For our products, four different wood species / treatments were selected: Norway spruce, biocidal treated Norway spruce, oak and black locust. During the implementation phase, a platform for online real-time MC observation was developed.

We organized two workshops for our target groups, stakeholders and others from different sectors in February 2018 and February 2019. In total, representatives of more than 290 SMEs attended both workshops. Workshops were related to service life of wood exposed outdoors and design of innovative wooden products for outdoors. FORESDA project and PIE activities were presented also on 49. International conference on wood protection in Johannesburg in 2018.

In 2018, the study visit of FORESDA project partners was realized. In addition, bilateral meetings with SUAS and UB FF project partners were held aimed to discuss about service life of wood and outdoor testing.

4. PIE ACHIEVEMENTS

In our opinion, the implementation of PIE project in Slovenia was very successful. Testing and monitoring of real objects in service is always a challenge. Nevertheless, in relatively short time we managed to expose test products and start with monitoring of moisture content, temperature and colour change of the products. Data from this monitoring will serve RO and SMEs to design new innovative wooden products with long service life. Added value of the project is also a platform which shows real-time, MC and temperature data. The Platform is now available in the Slovenian language and accessible on the following link: <http://193.2.23.31/eEMISv2/#/dash>. Great interest of FORESDA project partners, other RO and SMEs confirm the importance of the topic in the wood sector. We are very pleased and proud to have successfully organized two workshops with more than 300 participants for architects, engineers and others. In this way, we increase their knowledge on field of wood protection and sustainable and long service life of wooden buildings and outdoor equipment. The successful implementation of the workshops is evident in the interest of the participants to repeat the event in the following years. In frame of PIE, a national project Wood and wood products over a lifetime (WOOLF) was developed and accepted. The project is led by the M SORA company and will continue and upgrade the PIE activities.

4.1 CONTRIBUTION TO NATIONAL STRATEGY (RELATED TO FBI/FORESDA)

Slovenia has two main national strategic documents that refers to FBI sector. The first one is the Action Plan “Les je lep” (en. Wood is beautiful) and the second one is the Slovenian Smart Specialization Strategy (S4), an operational plan facilitating the shift to high-productivity economy. Within S4, the priority domain I.2 Smart Buildings and Home, including Wood Chain is defined.

The PIE contributes to the Action Plan at many points. At first, in terms of the promotion of wood; all activities in frame of PIE contribute in some way to the promotion of wood, sustainable wooden buildings and wooden products. Secondly, within the PIE an integration of R&D institutions in the development and introduction of modern technologies

in the industry along the entire chain is favoured. Thirdly, B2B networking and networking among RO is encouraged. In the implementation of our PIE project, close cooperation between Slovenian Forestry Institute and University of Ljubljana, Biotechnical Faculty and SMEs was established.

One of the main targets of the Slovenian Smart Specialization Strategy (S4), within the priority domain I.2 Smart Buildings and Home, including Wood Chain, are high, smart and sustainable wooden buildings. For such buildings new high-end monitoring systems should be developed. PIE supports this priority domain with information about service life and monitoring of wooden products. In addition cross-sectoral knowledge transfer to the architects and others from the field of sustainable wooden buildings and products is in line with the goals of the abovementioned priority domain.

4.2 CONTRIBUTION TO NATIONAL/REGIONAL DEVELOPMENT AND INNOVATION POTENTIAL

Wood has been recognized as a strategic material in the last years in Slovenia, therefore the demands for its rational use has been increasing in biomass and bioenergy sectors. In these terms, new innovative bio-based products for outdoor use developed within the PIE accompanied with recommendations on how to provide sufficient service life of such products are in line with the national strategy. A successful implementation of the Slovenian PIE and related dissemination activities are reflected in strengthened national and transnational networks, which results in numerous project applications applied to national and EU calls. As already mentioned above, in frame of PIE, a national project Wood and wood products over a lifetime (WOOLF) was developed and accepted in June 2018. The project is led by the M SORA company and will continue and upgrade the PIE activities. In addition, a project idea 'Mountain wood' was developed and will be applied to suitable call, presumably this autumn. The initiative is lead by Biotechnical Faculty, Dept. of Wood Science and Technology and includes R&D organizations and SMEs. Within this proposal, the use the findings of the PIE is planned.

4.3 CONTRIBUTION TO THE OBJECTIVES OF FORESDA

Activities and results of the Slovenian PIE are perfectly in line with the main aim of the FORESDA project to improve sustainable and eco-innovation framework conditions by supporting the collaboration between SMEs, R&D institutions, clusters and policy makers in the forest-based sector and other sectors in the Danube region. Namely, with designing and testing of innovative bio-based products and materials for outdoor use, the pilot addressed the thematic focus 'non-conventional uses of wood-based materials'. By involving other sectors in the PIE activities cross-sectoral aspect was taken into account, and by organization of two workshops educational aspect was given high importance. Transnational level was reached through presentation of the PIE results at webinar with international audience and through several project proposals on various national and EU calls.

4.4 HOW DOES THE PILOT CONTRIBUTE TO THE PROGRAMME PRIORITY “INNOVATIVE AND SOCIALLY RESPONSIBLE DANUBE REGION”?

The topic of the PIE fully complies with the DTP PA1 (Innovative and socially responsible Danube region) and SO1.1 (Improve framework conditions for innovation). The PIE activities were design to foster the collaboration between SMEs, R&D institutions, clusters in the forest-based sector and complementary sectors. It resulted in two successful cross-sectoral workshops with transfer of knowledge to the participants and identification of common interests for potential joint projects in the future. With designing and testing of innovative bio-based products and materials for outdoor use, sustainable and socially responsible use of resources / new products was considered. Established collaboration between knowledge poles and SMEs are a basis for development of new knowledge and ideas, their use and commercial exploitation.

4.5 HOW DOES THE PILOT FIT INTO EUSDR?

The Slovenian PIE supports three out of four pillars of EUSDR, i.e. Connecting the region, Protecting the environment and Building prosperity. Well-designed products with long

service life encourage confidence in timber and timber constructions. This will lead to higher demand of wood and lower energy consumption. High quality and well-designed wooden products and buildings improve the image of the cultural landscape, what will promote tourism in the Danube region.

By increasing the use of wood and processing near the source, we contribute to the protection of the environment and biodiversity. In addition, high added-value products encourage and require a higher level of employment and thus a better social position of people, especially those living in rural areas. PIE also promotes cross-sectoral collaboration, which contributes to the increase of the competencies of individual companies.

5. CONTINUATION OF PIE

Monitoring of outdoor equipment designed and made in the frame of the FORESDA project will continue after the completion of the project. Thus, the objects will remain on the test field site, at the Department of Wood Science and Technology and will be monitored until their complete degradation. The continuation of the experiment will be cheap, whereas the obtained data will be highly valuable for the researchers and SMEs. Namely, new gained findings will be helpful in designing new products and in developing maintenance plans for individual objects. Together with the SMEs and Wood Industry Cluster we intend to continue also with knowledge transfer activities in the form of workshops, seminars, invited lectures etc. Platform to show monitoring results will, be further developed in frame of other projects.