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1. EXECUTIVE SUMMARY

This document provides an overview of the Pilot Innovation Environment in Serbia developed within the FORESDA project. The PIE is a result of two activities: A4.1 Development of Pilot concepts which included creating of Pilot Working Group, developing of Pilog design and Roadmap; A4.2. Implementation of Pilot Environments which included monitoring and evaluation of Pilot.

Here the motivation for improving the wood drying process is explained and the PIE is shortly described through an explanation of four activities conducted. Finally, achievements are described in detail, including contributions of the pilot to national and European strategies.

2. MOTIVATION FOR PILOT INNOVATION ENVIRONMENT

2.1 BACKGROUND

Forest-based industry (FBI) – known as a traditional and low-profitable industry – has been facing many struggles in the 21st century. A competition from substitute materials (plastic, steel, hybrid materials) have taken significant market share in products that previously were made almost exclusively of wood (siding, windows, decking). However, some economic and social developments (growing purchasing power of developing countries, an increasing realisation of the environmental attributes of wood, concerns for climate change) offer a promising future for the FBI.

In the last twenty years, Serbian FBI has shown growth in terms of number of companies, number of employees, exports and positive trend balance. Companies are constantly modernizing their equipment in order to accommodate diverse trends and needs of their customers. However, the innovation capacity of SMEs is generally poor (no R&D sectors or investments, limited cooperation with R&D institutions, poor cross-sectoral cooperation). One of the most important processes in the wood industry is wood drying – it is the process that cannot be skipped, at the same time it is the most intensive process in terms of both time and energy. Timber drying remained – at the industrial level – based on empirical knowledge and that situation evolves very slowly. In the frame of the FORESDA project, a new concept of conventional timber drying was developed – oscillatory drying. The main idea of the concept is to improve results of traditional conventional drying in terms of drying quality, drying time and energy consumption.

2.2 OBJECTIVES

The main objective of the Pilot Innovation Environment and the specific Pilot related to wood drying process was to create a concept of oscillation drying - the improved method of conventional timber drying. It is the concept of conventional drying in which, in predetermined time intervals, air parameters in the kiln oscillate in comparison to the previously set scheduled parameters. This concept is the result of cooperation between

different sectors: R&D institution, mechanical engineering sector (kiln producer), IT sector (development of the new software) and wood industry companies, and could be an example of good practice in cross-sectoral collaboration.

3. SHORT DESCRIPTION OF PIE

Implementation of Serbian PIE was realised through the following activities:

Creation of the software needed for realisation of oscillation drying

This was done in cooperation with the company Nigos-elektronik (kiln producer) and IT experts. An addition to the existing drying software for oscillation drying was created. The important fact is that it can be used in the industry with no additional investments.

Realisation of oscillation drying tests

Drying tests with air parameters oscillations in the semi-industrial kiln located at the Faculty of Forestry were performed. The testing was done firstly in the empty kiln – for testing of the software itself and system stability, and afterward in the kiln with timber (beech timber 38 mm, oak timber 25 mm).

Analysis of drying quality, time and energy consumption

The influences of EMC (equilibrium moisture content) oscillations, temperature oscillations and the combination of these two on the drying quality, drying time and energy consumption was analyzed and compared to those in common schedules of conventional timber drying.

Knowledge transfer to SMEs

Knowledge transfer to SMEs was the result of two workshops dedicated to wood drying process (organised by Faculty of Forestry in 2018 and 2019.)

4. PIE ACHIEVEMENTS

The software for oscillation drying was created and tested in the kiln at the Faculty of Forestry. The system was stable in every oscillations setting. Drying times were shorter for almost all runs with oscillations (especially with EMC oscillations) compared to average conventional drying time for beech timber 38 mm. Runs with oscillations of EMC also

showed better drying quality as compared to conventional runs. First tests for oak timber drying were also good, both in term of time and quality.

As a result of successful tests – the software is implemented in all new kilns produced by Nigos-elektronik (Fig. 1).

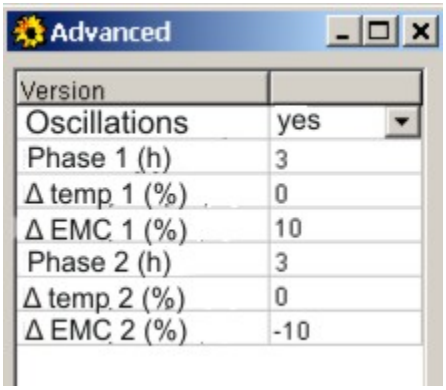

Figure 1. Setting the oscillations in a separate window of drying software

In the framework of the pilot, the important pillar was to foster cooperation between SMEs and R&D organisations in the form of Knowledge Exchanges and Project Developments. Two drying workshops were organised for SMEs (20 SMEs were present). They have received technical knowledge about timber drying in oscillation climate – how it works, when and how to use it. As a result of the promotion of the concept, cooperation with two SMEs was achieved through two independent Project Developments (both financed by SMEs). One of the companies is from Bosnia and Herzegovina what brings transnational dimension to cooperation.

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

Serbian Forest Based Industry is recognized as a strategic industry in government documents (such as Action plan for supporting export of the high added value products of the Serbian wood industry). The PIE contributes to this Action plan in different fields: cooperation between Faculty of Forestry and SMEs, cross-sectoral cooperation, organisation of trainings and seminars for knowledge transfers, promotion of wood as a material...

4.2 CONTRIBUTION TO NATIONAL/REGIONAL DEVELOPMENT AND INNOVATION POTENTIAL

Serbian PIE contributes to the national strategy dedicated to the development and competitiveness of SMEs (SME Development Strategy & Action Plan 2015-2020) which is in line with Small Business Act for Europe. The important part of this Strategy (Principle 8) is to promote the upgrading of skills in SMEs and all forms of innovation. Here the main pillar is Strengthening of sustainability and competitiveness of SMEs where few measures are related to the improvement of cooperation of faculties/technological parks with SMEs. The strategy recognises that "only one in seven enterprises implements innovative activities and only one in fourteen is making innovative cooperation with other business entities or institutions". Implementation of Serbian PIE where we had cooperation between Faculty of Forestry and SMEs (from different sectors) is fully in line with priority measures in strategy (M2 - Improve the support for highly innovative SMEs, eco-innovation, improvement of energy efficiency and efficient use of resources and M4 - Strengthen the awareness of SMEs of the importance of innovation for their competitiveness).

4.3 CONTRIBUTION TO THE OBJECTIVES OF FORESDA

The implementation of Serbian PIE strongly contributed to reaching the objectives defined for the FORESDA project. This especially applies to specific objective 2 which aimed at supporting cross-sectoral and transnational innovation. Activities taken within our Pilot addressed both cross-sectoral cooperation (university, kiln producer – mechanical engineering sector, wood industry SMEs) and transnational collaboration (project applications with FORESDA partners, cooperation with SMEs from other countries in the field of wood drying). The concept of oscillation drying is an example of the improved existing process in wood industry demonstrated also through two new projects with SMEs. All 3 keywords mentioned in the objectives of FORESDA – knowledge transfer, collaboration and innovation – are addressed during the implementation of PIE.

4.4 How does the pilot contribute to the Programme Priority "Innovative and socially responsible Danube region"?

The PIE activities contributed mainly to the Programme Priority Area 8 which aims to support the competitiveness of enterprises in the Danube Region. The implementation of pilot fostered cooperation and exchange of knowledge between SMEs, academia and the public sector. Also, 20 SMEs were supported through organisation of two trainings in the field of wood drying (PIE O4.2). Finally, considering that wood related SMEs often work in rural areas – improved production process directly contribute to the competitiveness of such companies.

4.5 How does the pilot fit into EUSDR?

The Serbian pilot contributed mainly to Pillar 3: Building Prosperity and Priority Area 7 – to develop the Knowledge Society. This is reached through fostering close cooperation, knowledge/experience exchange between SMEs and research institution (University of Belgrade – Faculty of Forestry). Also, one of the PA7 targets is to enhance regional research and education co-operation to reach 20% of academic mobility within the region by 2020. On the side of UBFF, this cooperation is improved within FORESDA project: ERASMUS+ project with Salzburg University of Applied Sciences, two 2-weeks scientific missions (one in SUAS, one in Biotechnical Faculty Ljubljana), a bilateral project with Slovenia...

5. Continuation of PIE

Pilot Working Group highly positive rated the pilot project during the final evaluation meeting. This means that further involvement of partners in this group is ensured. Upscaling of the oscillation drying concept – from the small kiln to industrial kilns is expected in the following months. This task is sensitive due to already present oscillations in industrial kilns which will ask for careful research for every kiln (or at least different approach for different kiln capacities). SMEs are willing to be involved in further research, and project application will be submitted at the national Innovation Fund.