

**PARTNERS:**



**COUNTRY:**



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**DESCRIPTION/OBJECTIVE:** ENERWOOD aimed to investigate energy models in the wood industry in order to achieve greater energy efficiency, thereby aligning with energy, climate and industrial policies at both European and national levels. To this end, ENERWOOD developed digital tools to analyze energy consumption and optimize its use in the wood manufacturing process.

## RESULTS & CHALLENGES

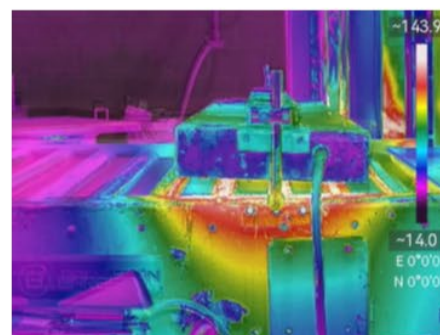
**WHY:** The sector faces high energy consumption and price volatility that impacts competitiveness. Furthermore, there is an urgent need to align with the European Green Deal and the Industry 4.0 Strategy. **HOW:** By using low-cost IoT sensorization (Shelly devices), developing a digital twin in MATLAB/Simulink, and applying Artificial Intelligence and computer vision (thermal and hyperspectral) to control critical processes. **WHAT:** Real-time monitoring of the pilot plant, creation of predictive models for consumption, and automated systems for classifying wood by moisture content.

**MAIN RESULTS:** **Savings Potential:** A potential economic and energy saving of **over 25%** has been identified following the implementation of the proposed measures. **Model Accuracy:** The developed digital twin reproduces plant consumption with a monthly error of approximately **5%** when validated against the main meter. **Drying Optimization:** The computer vision system allows for moisture-based classification that could result in **energy savings of 2-3% per kiln load** and significantly reduce "over-drying" defects. **Operational Control:** Real-time identification of consumption patterns and network anomalies, such as unexpected peaks or negative power values, facilitating proactive management.

**TARGET GROUPS/ POTENTIAL BENEFICIARIES** More than **3,000 specialized companies within the wood sector** in Galicia, including **First and Second transformation industries**. **Other sectors** could be beneficiated, thanks to the **replicability and scalability** of the developed digital models.

**FURTHER RESEARCH NEEDS:** **Industrial Scaling:** Refining the computer vision model to achieve a coefficient of determination of  **$R^2 \geq 0.9$**  (currently at 0.82) for mass industrial implementation. **Waste Treatment:** Conducting experimental validations in real industrial environments for the **drying of glue/water waste**, a highly energy-intensive process. **Self-consumption Systems:** Optimizing the maintenance of solar panels in environments with a high presence of sawdust and suspended particles.

**MAIN CHALLENGES TO BE DISCUSSED:** **Technical Installation Challenges:** Stability of Wi-Fi networks and sensor calibration in aggressive industrial environments characterized by dust and vibrations. **Profitability (ROI):** Balancing the cost of advanced technologies (such as hyperspectral cameras) with the return on investment through energy savings. **Dynamic Planning:** How staggering the startup of high-power machinery can avoid fiscal penalties for excess power demand.



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