

LIFE12 ENV/IT/000374

PROJECT OBJECTIVES:

The increasing demand for recycled wood to produce particleboard and MDF panels has resulted in the need to improve the cleaning process of post-consumer wood (e.g. pallets/wood packaging material, demolition waste, used furniture), eliminating in a more effective and efficient way plastic impurities. Now MDF panels are mainly obtained from virgin wood and only a small number of producers use post-consumer recycled wood (up to 10%, based on PAL internal studies on the market), because:

- the process requires multiple steps of cleaning that are not enough to completely remove impurities
- MDF panels are of low quality and not compliant with EN 622-5 and EPF Standard for delivery conditions of recycled wood.
- there are not systems in the market capable of achieving a good removal of impurities (see the State of Art paragraph).

LIFE+ PLASTIC KILLER main objective is to set up and demonstrate the viability of an energy efficient pilot plant able to finely separate post-consumer recycled wood from plastics impurities, in order to use it primarily for MDF panels production and secondarily as "purified" biomass.

This project will contribute to:

- pave the way for a new generation of more sustainable and affordable MDF panels produced by up to 60% of post-consumer recycled wood, compliant with EN 622-5 and EPF Standards;
- produce "purified" post-consumer wood that can be also introduced in the EU market as biomass for energy production, reducing the dioxin produced during the combustion;
- limit the use of virgin wood, supporting the non deforestation through the prolonged lifecycle of the recycled wood;
- foster the post-consumer wood recycle approach in the EU, open up new business and jobs opportunities; this also will contribute in the middle perspective to decongesting dumps.
- demonstrate the socio-economic and environmental sustainability, the potentialities of market replication and penetration of the proposed pilot plant.



plastickiller.eu



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Total Cost: €1.874.423
(contribution LIFE+: 49,78%)



Partner



CEPRA



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DEGLI STUDI
DI PADOVA

EXPECTED RESULTS

(OUTPUTS AND QUANTIFIED ACHIEVEMENTS):

- According to more achievable targets within the new time span, the following estimations are provided: input power of about 58kW maximum, a flow up to 30m³/h of waste (post-consumer wood).
- If we assume that the pilot will treat 78t/day of waste (post-consumer wood) and that from PAL's experience it's possible to estimate that there are about 0.78t/day of plastic impurities in this waste, 0.741t/day of plastic impurities can be eliminated and further recycled.
- Considering in a conservative way that 130t/day of virgin wood are needed to produce about 130t of MDF panels, the pilot plant will replace 78 t/day of virgin wood with the purified post-consumer wood, corresponding to avoid the cut of 40 trees per day from local forests. In addition, assuming that i) 0.9t of CO₂ are trapped in 1m³ of tree, ii) 9,600trees/year are not mobilised and transported by truck, iii) an average CO₂-emission factor for road transport operations of 62g CO₂/tonne-km [McKinnon 2011] and iv) an average distance from forest to sawmill of 300km [Le Net. 2011], additional CO₂ savings are possible.
The whole CO₂ trapping and saving amount is about 88teCO₂/day.
- Under the assumption of the Life+ project time span and treating 78 t/day of waste (post consumer wood) in such demonstrating context, the challenging but realistic targets can be reformulated as follow: the estimated annual savings of water by PLASTIC KILLER are about 9,288m³, corresponding to the annual water consumption of about 46European families.
- Considering the Life+ time span in a pilot configuration and that the PLASTIC KILLER pilot is going to substitute in weight = 78t/day of virgin wood with the purified post-consumer wood in MDF panels production, there will be enormous economic savings that justify the proposers investment in the project. In fact, assuming the following as average costs (70€t virgin wood or pre-consumer wood; 40€t post consumer wood), the economic savings are about 2,340€day (503,100€year)
- In a pilot configuration, it is expected that using 78t/day of post-consumer wood, the pilot plant will eliminate about 741kg/day of plastics impurities out of 780kg/day, which will avoid the dioxin emission of about 563ng TEQ/day (considering a density of 150kg/m³ and the estimation from Schatowitz, see section B2).

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INSTALLATION OF THE UNITS AND CONSTRUCTION OF THE PROTOTYPE PILOT PLANT

All the components indicated in the pilot plant have been constructed: Belt Conveyor, Plastic Killer, Metal Killer, Vibrating Feeder, Belt Board Conveyor, Filtering Valve, Air Recycling Cleaner, Dynascreen, Induction Grading Machine. Università di Padova collaborated to the installation and the set-up of the prototype, working mainly on the illumination system, and on the optical and spectroscopic system. The pilot plant went through a preliminary cycle of set-up tests in order to verify its functioning according to the specifications of its final executive design; all the single units were tested before and after interconnections. PAL performed several tests on the camera control system, focusing on the detection, identification and selection processes at various speeds of the conveyor belt, for different volumes of material. The pilot plant was tested with one camera first (test with virgin wood with the addition of different content of plastics, and test with recycled wood with the real content of laminated wood), and then with both cameras (upper and lower) to verify the synchronism between them and the performance of the industrial PC in the computation. Other kind of tests were done: tests with small lamps to reduce size and power absorption, and tests with reduced ROI (region of interest of spectrum) to increase the camera frame rate. The tests demonstrated that the pilot system is able to remove up to 95% of plastic impurities from the recycled wood, so the targets of the project can be achieved.

In May 2016 the Plastic Killer was presented at Xylexpo Fair in Milan.

