



Report on upscale-  
LIFE13 ENV/IT/000996



# LIFE2013 GREEN JOIST

LIFE Project Number  
**LIFE13 ENV/IT/000996**

**GREEN JOIST**

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**Life-GREEN JOIST PROJECT :  
Report on replicability and upscale**

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#### Dissemination Level

PU	Public	<b>X</b>
PP	Restricted to other GREEN JOIST programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	



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## 1. INTRODUCTION

### Scope

This document describes the commissioning of the industrial line. Starting from a production facility – EIREBLOC- Ireland-Cork- which was already equipped for the manufacture of wood products [pallet blocks made from fresh or recycled wood fibre] greatly facilitated the start-up of the pilot line. The next step now is to move towards the industrialization of the new project.

### The project

GREENJOIST is an innovative process for recycling wood waste to produce high quality, cost-effective, eco-friendly joists made of Super Compacted Recycled Wood (SCRW). Each year in Europe an estimated 15 million tonnes of discarded wood, or enough to fill a train 3km long, goes to landfill or incineration. This project shows the benefits of a full recycling process based on the production of innovative high value materials: not only will landfill or incineration of 10 ton/day wood waste be avoided, but a new high quality product has been produced from the recycled material using eco-friendly components. The successful implementation of the project strongly contributes to fulfilling the objective of Europe to become a recycling, sustainable society that avoids waste by treating it as a resource. In fact while Europe is on track to becoming a recycling society, with 25% of wood waste still landfilled, there is yet much to do to increase recycling rates, and to consolidate current practices, while greening production and expanding the potential market. The GREEN JOIST - which is also at least 35% cheaper than wood ones - can be employed in many fields where virgin wood is currently used, namely the manufacturing and construction industry which consumes at least 60 million cubic metres of timber skids and supports made of virgin forest wood each year, and which could be substantially substituted by the eco-friendly GREENJOIST.

GREENJOIST aims at demonstrating the value and feasibility of an eco-innovative recycling process, able to reuse and valorise wood waste to produce green, high quality and cost-effective joists to be used in different sectors such as manufacturing, transportation, logistics and construction. This contributes to the consolidation of sustainable eco-innovative businesses in the EU woodworking industry contributing to the achievement of EU 2020 goals of Resource Efficiency, avoiding dangerous impacts on human health and the environment. With a potential to substantially cut the currently landfilled wood waste, amounting to 15 million tons per year, the GREENJOIST project set out a well-structured plan with the following key objectives:



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- a. Showcase an innovative process for the production of high-quality, cost-effective joists from recycled wood waste through the realization of a pilot plant at pre-industrial, non-commercial scale demonstrating the feasibility and effectiveness of this novel recycling process
- b. Foster a sustainable society and economy where waste, which is both harmful and costly, is used as a valuable resource and manufacturing is committed to the environment
- c. Increased awareness of eco-innovative solutions in both the general public, policy makers and woodworking industry, focusing on the environmental and economic advantages as well as on their technical feasibility
- d. Promote the shift from using potentially harmful chemicals to natural components in the woodworking industry

The analysis of the scalability of the pilot plant are correlated to the success of the new technical solution launched on the market.

The project can be replicated in any industrially developed reality, as it requires wood, recycled or fresh wood as the raw material, available in a sufficient quantity for an economic production.

The sizing and capacity of the line will depend on the actual market requirements, but it is always feasible as the pilot line may be replicated for  $x$  number of times.

At one year from the end of the project and the presentation of the new product at various trade shows, the market does not seem quite ripe enough yet, as manufacturers do not feel sufficiently pressured into utilizing recycled wood in a circular economy and hence to move into this line of business. We shall continue to promote the product at the tradeshow to make the various potential stakeholders aware of this new technology to produce joists from recycled wood.



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## 2. SCALABILITY OF THE PLANT IN TERMS OF DESIGN AND INSTALLATION AND IN TERMS OF COMPARISON WITH STAKEHOLDERS

We have analysed the replicability of the project on the various markets, identifying any problems which could emerge in the development of this new line of business.

Contacts with individual companies, local customers, who showed an interest in implementing joist production within their own reality as well as the question of the sustainability of their production, are considered as an added value to increase the potential scalability of the GREENJOIST technology at a local level as well as within the EU.

In addition, these aspects were analysed:

- industrial/technical: the aim of which was to verify the scalability of all the equipment and the added value for producing large volumes of joists from recycled waste wood. This is true as each production line can be replicated x times.
- The economic and environmental advantages of the solution were analysed with respect to the virgin wood product as a benchmark.
- Commercial: an analysis of the economic feasibility of the industrial solution on a large scale, which was submitted to IMAL Management first and then to the other partners, has been made available on line to increase environmental awareness on the circular economy concept and hence to create new industrial realities with a low environmental impact.

The possibility of replicating the green joist production line x number of times on the same industrial site implies an open scalability with an economic limit only.



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### 3. MARKET FORECAST FOR JOIST PRODUCTION LINES

It is necessary to rely on the experience which IMAL has in marketing pallet block production lines for the market analysis.

It has taken about 10 years for this business segment to reach 20% of the IMAL sales volume (which was 100 million euro in 2018). Under these circumstances, it will be difficult to achieve results in the short term unless some laws are changed on waste disposal, applying the concept of a circular economy to the whole of Europe.

The priority now is to find a customer where the upgraded version of the spiral conveyor that was validated at EIREBLOC could be installed. We had identified a potential customer near the IMAL workshop but regrettably the facility was partly destroyed in a fire about seven months ago. This will delay the installation of the first line by almost two years.

The economic forecast could be the following:

Type of unit sold	No.	One year after project
Screw conveyors+ extrusion channel	1	2
Screw conveyors+ extrusion channel	1	3
Screw conveyors+ extrusion channel	2	4
Screw conveyors+ extrusion channel	2	5

The situation in Europe, but above all in Italy, is moving towards an increase in costs for disposing of recycled wood and this would be an excellent opportunity for developing the green joist business.



#### 4. LCA ANALYSIS

As the project reached its conclusion in June 2018, we reviewed the data from the implementation of the prototype line, and these confirm the results already obtained from the earlier LCA analysis on the production of environmental friendly joists.

It is clearly seen how the production of the GreenJoist joist has an impact that is **significantly lower in terms of GWP than the production of a traditional joist**. The comparison between the two processes in terms of CO<sub>2</sub>eq produced is shown in the graph of Figure 1.

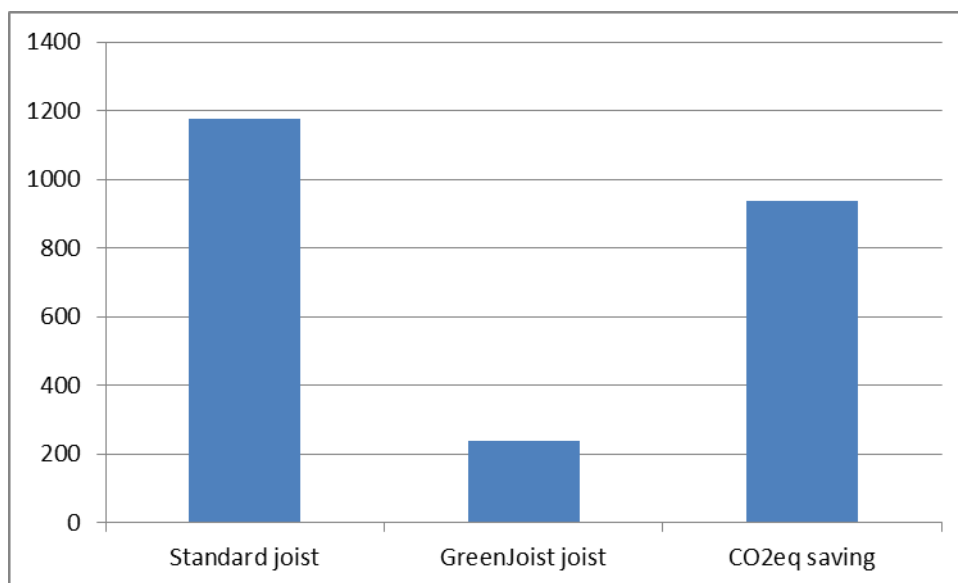


Figure 1 – Comparison between GreenJoist joist and traditional joist total carbon footprint

As expected, **the savings achieved thanks to the innovations introduced by the GreenJoist production process in terms of CO<sub>2</sub>eq are considerable, precisely they are equal to almost 80%**. The greatest benefits are related to the use of recycled wood, which avoids the production of wastes and their subsequent treatment and which represents the most important innovation of the LIFE+ GreenJoist project.

The expected benefits described in the LIFE+ GreenJoist project have been confirmed, and the LCA study has demonstrated that the substitution of virgin wood with post-consumer recycled wood in the production of joists enable the reduction of the impact on the environment in terms of GWP of about 80%.



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## 5. CONCLUSIONS

The project presents excellent opportunities of development on the European market both in terms of scalability and embraces the philosophy of a circular economy, consenting the possibility of achieving competitive advantages over the production of fresh wood joists both in the medium and the long term.

The development of the project to produce a recycled pallet block line began back in 2003 and it is only now, after 15 years, that we have a high demand for this type of production line.

The Consortium, during the various tradeshows that it will be attending, will promote the sale of the recycled wood joist production line, in addition to offering such a solution to its customers. In this respect more opportunities are coming up in Italy due to the fact that the wood cannot go to landfill or waste-to-energy plants.