

REBRICK

Market uptake of an automated technology
for reusing old bricks

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Layman's Report

For more information about the project, please visit:

www.gamlemursten.eu/



eco-innovation 

Introduction

The REBRICK project aims to create the first market uptake of a technology which enables a paradigm change within demolition waste handling and recycling in Europe. Currently, building demolition waste, including cement, mortar and bricks, is either land filled or crushed and recycled despite the fact that bricks can easily last for several centuries. As the baking of new bricks is very energy and resource intensive, the ability to recycle bricks will have a major environmental impact through reduced CO2 emissions and reduction of waste.

Over the past 5 years, the Danish SME Gamle Mursten (GM) has developed and demonstrated a technology, which exploits the huge recycling potential of used bricks through automated sorting of demolition waste, separation of old bricks, and cleaning using vibrational rasping, making each brick ready for reuse.

REBRICK at a glance

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|-----------------------|---|
| Project Acronym | REBRICK |
| Project Full Title | Market Uptake Of An Automated Technology For Reusing Old Bricks |
| Agreement Number | ECO/08/239110/SI2.535262 |
| Starting Date | 30/07/2011 |
| End Date | 30/01/2014 |
| Total Cost of Project | € 1.465.868 |
| EU Contribution | € 713.140 |



Background

Reusing bricks had been a common practice until a few decades ago. After the Second World War, huge quantities of bricks were used from war torn buildings for rebuilding most of Europe. However, brick recycling, although simple, has been an extremely labour intensive process. Hence as labour costs rose, the cost of reused bricks surpassed that of new bricks baked in automated processes.

As a consequence, recycling of bricks fell out of use beyond those bricks used for the historic buildings' renovation that are hand clean, where the major cost is justified by the added value of the application. Instead, Gamle Mursten developed a technology that allows to automate the cleaning process, and thus to clean bricks at a competitive cost.

Project Objective

The key objective of the project is to ensure a European wide adoption of bricks reusing across multiple municipalities and regions while improving the project technology in order to better fit the European market.

The REBRICK Technology

The REBRICK technology consists of a vibration based system that cleans mortar from old bricks. Firstly, the demolition brick debris is loaded into a hopper which is then transported on conveyors to the separator that separates mortar from the bricks. An automated system further separates full bricks from broken or damaged bricks. The bricks are then cleaned in a vibration based process that is protected by a Danish patent. After cleaning, the bricks are manually sorted according to their visual characteristics, quality and value and placed on a conveyor system to be automatically stacked by a new robot system that was incorporated in 2009.

The bricks are cleaned by a metal mesh where no water or chemicals are used and thus it is a very environmentally friendly process. The bricks are transported through the separation and cleaning process by means of a conveyor which is continuously subjected to vibration produced by 2 electrical engines on each vibration machine. These machines can be disassembled and the entire production facility can be moved to another location in a matter of weeks. Hence, it is technically possible to locate the facility close to areas with huge demolition potentials and later, once the buildings are demolished, to move the entire facility to a new location.



An Old Brick Allows to:

- Transforming waste into a product
- Saving 500g CO₂ for every brick reused
- Sustaining the lifecycle of a product with an energy intensive production process
- Creating jobs across Europe
- Giving new buildings soul and legacy
- Turning brick-supply into an advisory service
- Rebirth of a brick Rebirth of a building
- Provide architects with creative possibilities and builders with commercial arguments
- Endowing a commodity with history and storytelling

Old bricks with Character and a History

A Converted Landmark Silo Warehouse Building

No. of bricks supplied: 120 000 Tonnes of CO2 saved: 60
Architect: Archidea



The Kindergarten Børnehuset Brobækken

No. of bricks supplied: 30 000 Tonnes of CO2 saved: 15
Architect: Arkitektfirmaet TKT A/S



Sønderborg's New Production College

No. of bricks supplied: 50 000 Tonnes of CO2 saved: 25
Architect: Aarhusarkitekterne A/S



Tove's House

No. of bricks supplied: 30 000 Tonnes of CO2 saved: 15
Architect: Arkitektfirmaet Therkildsen ApS



Old Craftsmanship Transformed in a Modern Villa

No. of bricks supplied: 35 000

Tonnes of CO2 saved: 17.5

Architect: Lotte Foght-Sørensen, Mangor & Nagel

Project Results

- At the end of the project the following results are foreseen:
- Establishment of a successful full scale plant at Copenhagen (4000 brick per hour capacity) and a Supply Chain Ecosystem for future market replication.
- Conduction of a European wide comprehensive market study and dissemination activities for understanding and expanding the markets for used bricks.
- Lobbying with local and European public bodies for influencing legislations aimed at waste management.
- Devising a comprehensive market strategy, with a special focus on huge demolition sites in Germany and Poland.
- Development of a comprehensive licensing strategy for promoting the start up of new SMEs across Europe, which will replicate the model used at the Copenhagen demonstration site in order to foresee the growth in the number of SMEs, establishing their business on the GAMLE MURSTEN technology, across Europe in 10 years post project.
- Technology customisation for different markets (along with appropriate technology protection and application of patents in regions outside Denmark) in order to ensure that the technology is upgraded and adapted to the needs of the different markets.
- Development of a positive image for reused bricks as a safe and reliable option with an aesthetic look and as a crucial element for environmentally friendly homes.

Ecological Footprint

The REBRICK technology is safe and environmentally friendly as it does not use any chemicals or water as has no dangerous byproducts. Since this is a completely automated setup, there is little risk of safety issues to the operator. It is already in conformance with CE markings and the operational prototype has been regularly approved by the local regulatory authorities in Denmark. Reusing bricks significantly reduces the amount of waste that is generated, and helps municipalities in better managing land fill sites, especially in light of restrictions and shortage of sites in many municipalities.

According to a preliminary carbon footprint analysis, by reusing 2000 bricks rather than using newly produced ones saves the atmosphere 1000 kg of CO₂ emissions. This is equivalent to 0,50 kg CO₂/brick.

If the market potential of 300 million bricks annually is reached, it would amount to a carbon emission reduction of 150000 tonnes of CO₂ emissions annually.



| Environmental Targets in 2 years post project | |
|---|----------------------------------|
| Waste Reduction Target | 54.000 Metric Tonnes |
| Co ₂ Emission Reduction Target | 13.500 Tonnes of Co ₂ |

Economic Benefits

Taking into account that the old bricks offer an additional value in the form of antique value, traditional and historic feel and positive environmental effects, their selling price has been easily fixed between 0,6 EUR and 1 EUR per brick depending on the quality and appeal. Considering an estimated market potential of old bricks that stands at 300 million bricks annually within the European Union, for a facility of the size of the Copenhagen production plant, if free delivery of demolition debris is guaranteed, a processing cost to the company on a per brick basis would be approximately 0,30 EUR. With a peak capacity of 4000 bricks an hour, the processing potential of the plant would be around 8,5 million bricks a year. However a more pragmatic estimate based on general supply disruptions gives an approximate figure of 6 million bricks processed annually after the plant has stabilised production. It is expected the above production figures to stabilise in 2 years after the plant begins operation. **With a healthy annual profit of around €0,6 million, and a ROI of below 2 years, the project has a high economic sustainability potential and this demonstration facility can provide enough revenues for further investment in similar plants across Europe.**

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|--|-------------------|
| Production Cost per Brick | € 0.30 |
| Marketing, Administration, Maintenance, Transport and Advertising Cost per Brick | € 0.10 |
| Dealer Margins | € 0.10 |
| Sales Price (average) per Brick to End User | € 0.60 |
| Profit Margin per Brick | € 0.10 |
| Average Annual Production Numbers | 6 million Bricks |
| Average Annual Profits | € 0.6 million |
| REBRICK Plant Cost | € 0.9 million |
| ROI (Years) | Approximately 1.5 |

New factory for cleaning old bricks near Copenhagen (Hedehusene), Denmark

The new factory opening has been celebrated at Gamle Mursten's new site near Copenhagen the 31st of May 2013.

The first bricks to run through the machine were yellow bricks from the agricultural University in Copenhagen and red bricks from the former Carlsberg production, which has been moved and the production site will now make room for a sustainable town. The Climate, Energy and Building Minister, Mr. Martin Lidegaard joined the event, starting it with an opening speech.

Actually a house containing the soul and history of Carlsberg can be built!



More info:

<http://www.carlsbergbyen.dk/nyheder/325/mursten-fra-ny-tap-genbruges/>



Consortium



Gamle Mursten Aps has been established in 2003 and has been working towards the development of a novel automated brick cleaning technology. It has constantly updated its technology and has reached the point where it has ambitions for a European wide expansion.



Scan Vibro was founded in 1949 by Bryde Westergaard and Jens Nielsen, two innovative technicians with a vision to use vibration technology for process industries. Scan-Vibro makes equipment of the highest quality mainly for the Food, Feed, Chemical-Technical and Pharmaceutical industries.



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