Case Study **Woodoo**

WOODOO aims to replace steel, concrete, glass and plastics with wood-based materials

European Innovation Council

eit Climate-KIC

Impact Shift

Co-funded by the European Union

WOODOO aims to replace steel, concrete, glass and plastics with wood-based materials

- The start-up's nanotechnology for 'augmented wood' was developed in 2010 and patented in 2015.
- Their first product – a touch-sensitive, translucent augmented wood panel – is 87 per cent less carbon intensive than glass or plastics.

What is WOODOO's climate-positive innovation?

WOODOO's 'augmented wood' is translucent when backlit, fire-resistant, touch sensitive and up to five times stronger than normal wood.

The company's nanotechnology was developed by Timothée Boitouzet at MIT in 2010, while on a Fulbright scholarship to Harvard University. Newly qualified as an architect, his personal mission was to help reconcile the growth of cities and a looming global housing shortage with the urgent need to decarbonise construction.

A patent was awarded in 2015 and in 2016 Boitouzet founded WOODOO which is today the 'most awarded' start-up in Europe.

How it works

Wood is 60 to 90 per cent air. WOODOO's two-step process removes this air as well as lignin in the cell walls of low-grade wood and replaces it with a filling compound. This process retains the structure and grains of wood but transforms it into a new material with its own characteristics.

"It is 23 times more rigid than concrete, and just as solid as steel."

Applications

Experimentation revealed unexpected applications for augmented wood.

In 2020, WOODOO launched their first product, called SLIM panels. Clients work with WOODOO to adapt the panels for a range of applications, including:

- as a replacement for silica glass panels on giant LED screen walls
- as touch- and gesture-sensitive interfaces (produced by integrating sensors under the wood) including for smart surfaces in luxury cars.

The company has also developed wood alternatives to fabric and plastics.

What are the problems and opportunities WOODOO addresses?

Construction and heavy industry

The steel and cement we produce today already accounts for 15 per cent of the world's CO_2eq emissions. UNIDO calculates that demand for these materials will grow by more than one-third by 2050 and that to accommodate massive urban expansion as the population grows, "the equivalent of another New York City will be built every month for the next 40 years".

Boitouzet has calculated that his process will one day enable WOODOO to build 50-storey buildings – double the height of today's tallest wooden building. Construction grade WOODOO wood is in research phase at the company's laboratory.

Regenerative materials

WOODOO uses low-grade trees such as poplars, aspens and firs from regenerative forests to manufacture their materials and is also experimenting with unwanted woods such as dead wood, diseased wood and dieback wood. Boitouzet hopes this will reduce the demand for fine woods, which grow more slowly. Woodoo is also looking into uses for the extracted lignins.
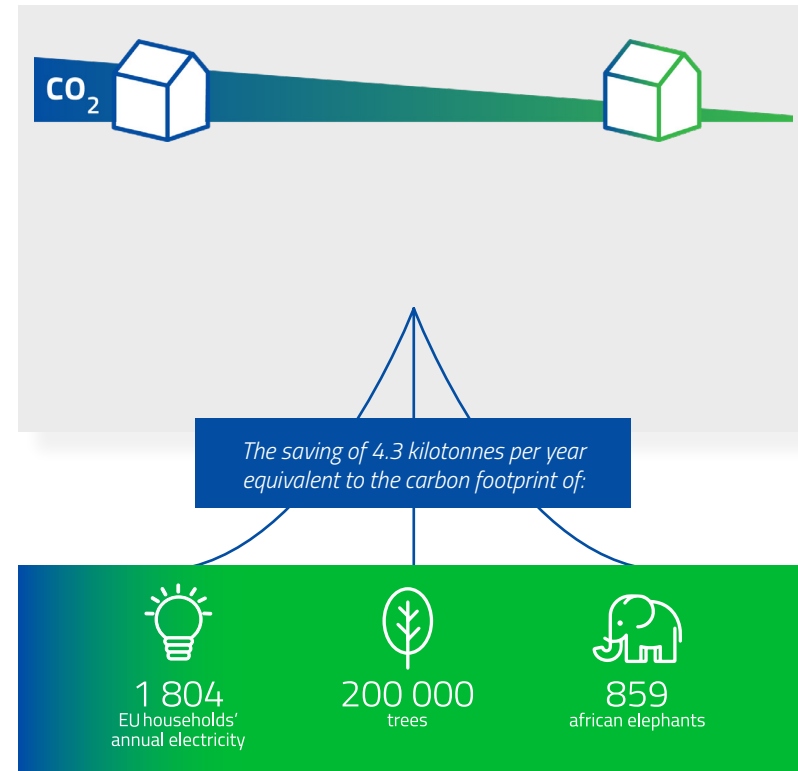
What were the results of your Impact Shift calculations?

As a carbon-efficient materials company, WOODOO aims to help industries and corporations meet their carbon-neutrality commitments across a growing portfolio of biomaterials.

Baseline and boundaries of the forecast

For this pilot study, WOODOO chose to calculate the potential climate impact of their SLIM materials using traditional silica glass panels as the baseline for comparison.

AVOIDED EMISSIONS

CO_2

The saving of 4.3 kilotonnes per year equivalent to the carbon footprint of:

1 804
EU households' annual electricity

200 000
trees

859
african elephants

"Woodoo transforms wood at the molecular level. Our mission is to develop a portfolio of biomaterials for the decarbonized construction industry, amongst others. On this journey we discovered and manufacture innovative solutions: wooden screen walls, wall light panel or smart wooden interfaces.

We are constantly innovating around new applications for augmented wood at our own lab and with industrial partners. The Climate Impact Forecasting Tool has been an invaluable aid to experimentation, allowing us to model and test the carbon efficiency of different scenarios before decisions are made."

- Hugo Jupile, CSR Engineer

The results

The company offers an alternative that has the potential to be 87 per cent less carbon intensive than silica glass.

There is potential to save around 21.5 kg of CO_2eq carbon emissions with every square meter of protective cover they produce. This would amount to a yearly total carbon emission saving of 4.3 kilotonnes of CO_2eq for 200 000 square metres of cover.

In a year, this saving is equivalent to the CO_2eq sequestration potential of almost **200 000** trees or neutralisation of CO_2eq emissions from **1 804** EU households.

EU Green Deal

Woodoo was founded on a desire to decarbonise the construction industry. Its research is still primarily focused on the EU Green Deal objectives of 'Building and renovating in an energy and resource efficient way', 'Mobilising industry for a clean and circular economy', and 'A zero-pollution ambition for a toxic-free environment'. Their approach to sourcing wood aligns with the EGD objective of 'Preserving and restoring ecosystems and biodiversity'.

How did you use the tool and how did it benefit you?

Hugo Jupile, CSR Engineer says:

"Woodoo transforms wood at the molecular level. Our mission is to develop a portfolio of biomaterials for the decarbonized construction industry, amongst others. On this journey we discovered and manufacture innovative solutions: wooden screen walls, wall light panel or smart wooden interfaces.

We are constantly innovating around new applications for augmented wood at our own lab and with industrial partners. The Climate Impact Forecasting Tool has been an invaluable aid to experimentation, allowing us to model and test the carbon efficiency of different scenarios before decisions are made."