Nourishing tower



The tower's signature is fluid and dynamic like the wind, but also organic. The curved omegas form cells that play both a structural and visual role. They symbolise the sap rising in the tree, but conversely, they can symbolise the energy extracted from the wind towards the ground, a nourishing fluid for humans, hence its name.

Nourishing tower _ wooden tower wind-turbine
Location : Italy

Rendering image : © Ernesto ESTAVAVI
2025
Wind-turbine design project _ CG _ «Nourishing tower»

Aesthetic

«The nourishing tower»

The project involves creating a wooden tower to house a wind turbine. Our aim is to show that this tower is not like a traditional steel tower, thereby highlighting the advantages of wood, but at the same time we have to comply with certain constraints, which are positive in a design process, particularly wind flow. We don't want to disrupt the wind too much and create turbulence. We have therefore decided to design a wooden structure that will be covered with composite panels made from recycled fibres or flax fibres, and to show only eight curved, organic lines in plywood, which will serve as the tower's signature feature.

When we talked about a green landscape, we were referring to a natural colour, i.e. a brown colour at the base, up to the natural colour of Bcomp's linen products at the top. And for a desert landscape with a pink hue, we could design a pink colour that fades to white at the top and a bright red colour at the base.
If we want to stick with a conventional wind turbine, we could make it entirely white. Conversely, if we want to have an impact on the environment and use the wind farm as a work of art/art installation, we could play around with graphics such as black and white panels.



The idea we want to convey with the wind turbine is to create a link between the ground, the earth and the sky. It will therefore start with the colour found on the ground and then evolve towards the sky, which is light tan. The idea of a bright colour at the base serves to detach the wind turbine from its surroundings and create a contrast that will highlight the artefact in its natural environment. Paradoxically, detaching the artefact from its environment allows it to be better integrated. Of course, we can also choose not to create any contrast and try to harmonise the tower with its environment, as we have done in the image on the left.



All-white tower retaining the undulating signature of the tower.



Graphic tower in black and white contrasting with their surroundings.



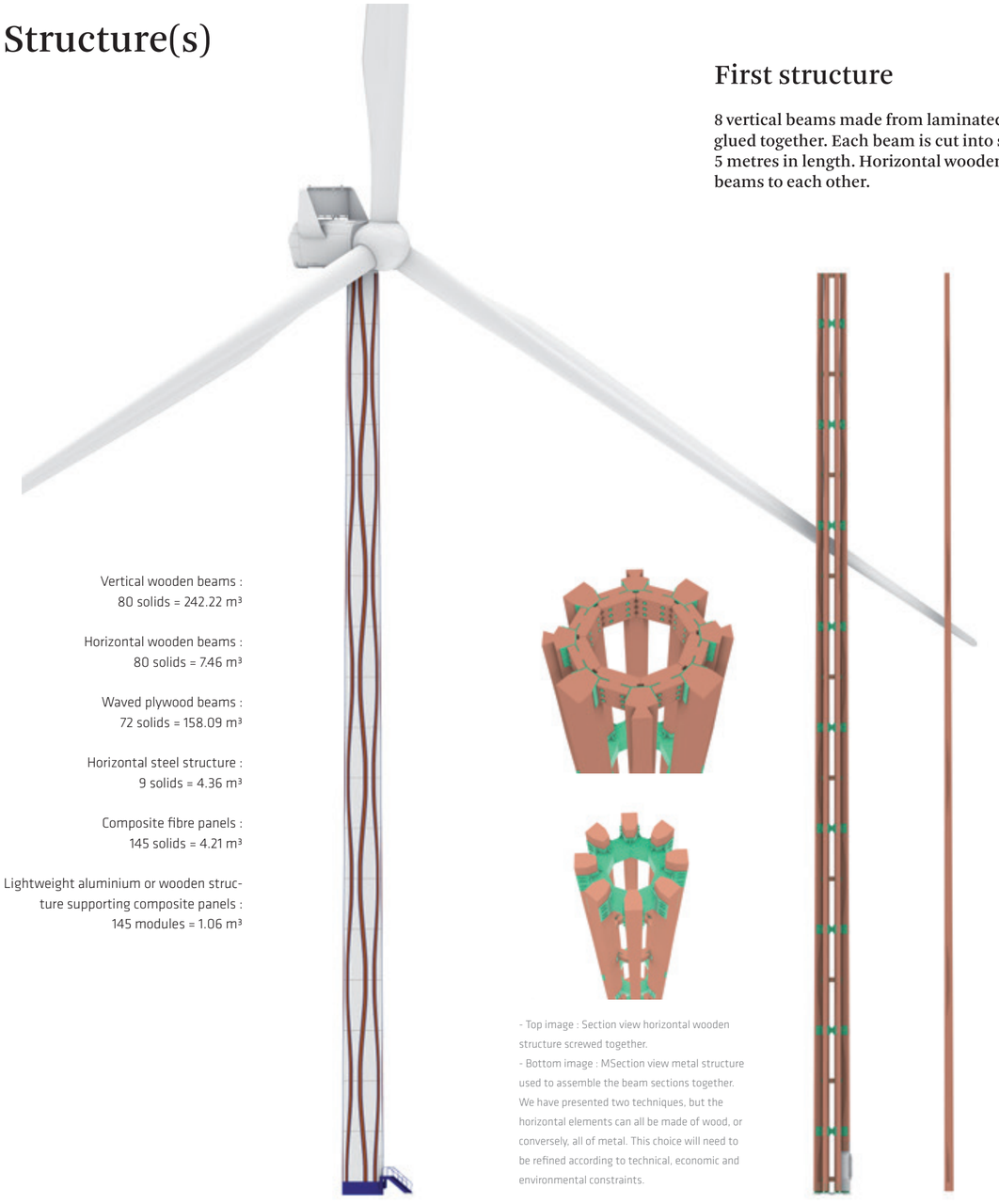
Pink tower fading to white



Wooden tower, with wood veneer covering the entire surface.

ENEL - WIND design competition _ © Christophe GUERIN _ 2025

Structure(s)



Vertical wooden beams :
80 solids = 242.22 m³

Horizontal wooden beams :
80 solids = 7.46 m³

Waved plywood beams :
72 solids = 158.09 m³

Horizontal steel structure :
9 solids = 4.36 m³

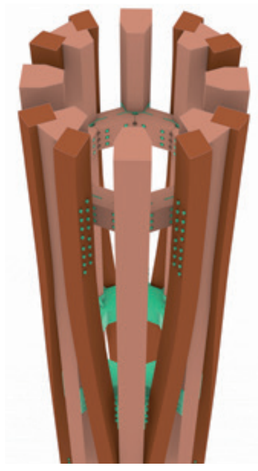
Composite fibre panels :
145 solids = 4.21 m³

Lightweight aluminium or wooden structure supporting composite panels :
145 modules = 1.06 m³

- Top image : Section view horizontal wooden structure screwed together.
- Bottom image : MSection view metal structure used to assemble the beam sections together.
We have presented two techniques, but the horizontal elements can all be made of wood, or conversely, all of metal. This choice will need to be refined according to technical, economic and environmental constraints.

First structure

8 vertical beams made from laminated timber or plywood panels glued together. Each beam is cut into sections measuring 10 and 5 metres in length. Horizontal wooden elements that connect the beams to each other.

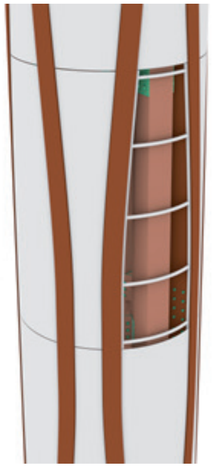


Section view : Each corrugated plywood module is glued and screwed to the main structure.

Second structure

8 wavy omega beams made of plywood veneer glued and pressed into a mould. Only one mould, one type of module 10 m long.
One side of the wooden part will be visible from the outside of the tower, like a visual signature.

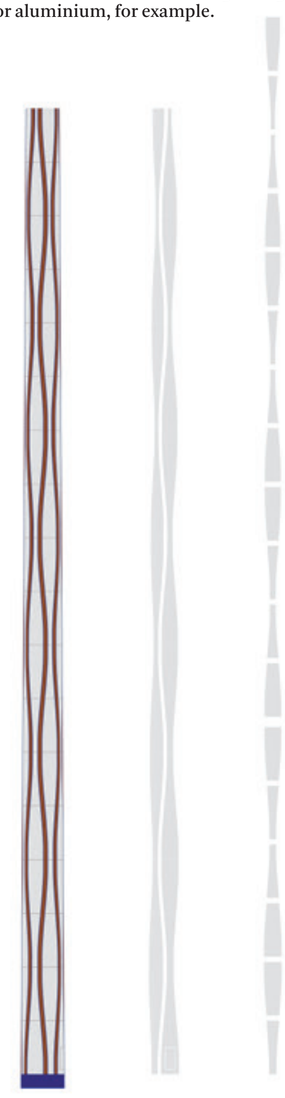




Lightweight structure onto which we will screw thin composite panels.

Third structure

8 wavy thin panels that will protect the core of the tower from wind, rain and fire. The panels will be manufactured and transported flat. On site, they will be screwed onto a lightweight structure, made of wood or aluminium, for example.



Structures
The tower structure is composed of three different types of elements, all of which are the size of a semi-trailer, approximately 10 metres long. This means that the entire tower can be produced and transported by container, then assembled on site.
For environmental and cost reasons, the elements that make up the structure are straight, flat or curved in one direction, which means they are easy to produce and relatively affordable.
Most of the elements also come from natural resources, such as wood, flax or recycled materials, like carbon fibre or fibreglass. Indeed, the world of composites is moving towards recycling, and we can now buy second-cycle materials that resemble felt. This material comes from composite parts, from which the resin is dissolved and the residual fibres are assembled in the form of felt. In the near future, it will therefore be possible to say that the fibreglass materials that make up the blades can be recycled into felt, which is the raw material for the cladding panels of new-generation wind turbines.

First structure
The core of the tower consists of eight vertical beams. Each beam is cut into sections measuring 10 and 5 metres in length. These beams can be made from laminated timber or plywood panels glued together. To save on materials, each beam is wider at the base than at the top, due to the load distribution. This allows us to produce flat rectangular beams and then cut them at an angle to obtain two beam elements of different sizes. In order to connect them to the cross beams, each element will be milled using a CNC machine to create a cavity into which the cross beam can be inserted and glued.
Each element will then be bonded in place. A structural engineering study will tell us whether we need to bond and bolt them together, or simply bond them. For now, we have designed steel elements that will hold the parts together and bolt them while the adhesive cures.
We also have horizontal wooden elements that connect the beams to each other.

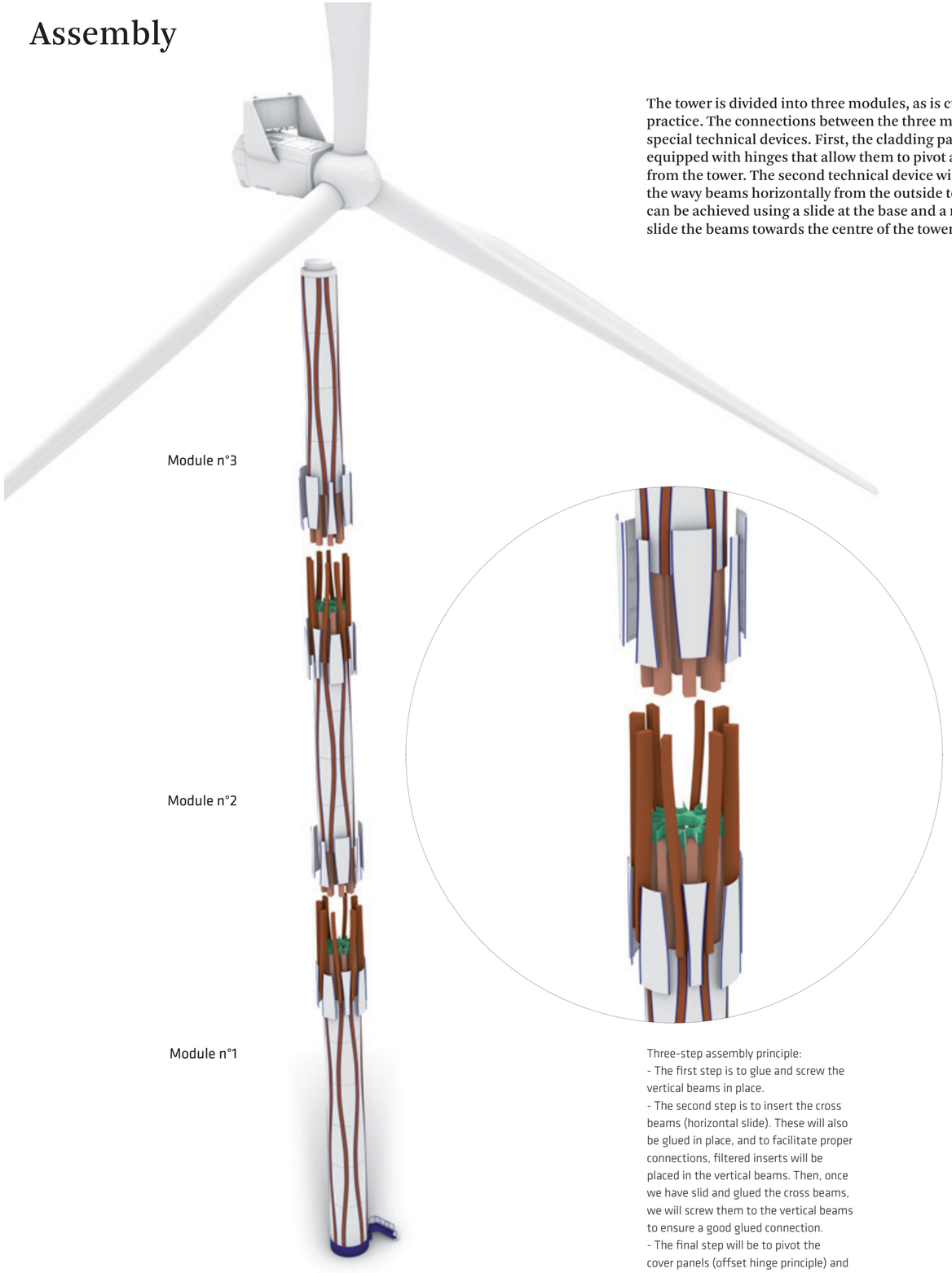
Second structure
The second structure consists of cross beams that connect the vertical beams. They act as omegas to reinforce the tower structure. These elements are made of plywood veneer glued and pressed into a mould. For economic reasons, there is only one mould, one type of module. We therefore press the wood veneer in a parallel and orthogonal mould that resembles a wave, then each element is cut and milled using a CNC machine. To help protect the wood, the two external surfaces can be covered with melamine or any other material that protects the wood from UV rays and fire. We can also use coloured laminate for a more cheerful look.
Then, each element produced, again from a single mould, will be glued and screwed onto the main vertical structure. One side of the wooden part will be visible from the outside of the tower, like a visual signature.

Third structure
The third structure is not structural. It is composed of panels that will protect the core of the tower from wind, rain and fire. For example, the first 10 to 15 metres of the tower will be made of non-combustible material. The rest of the tower will be composed of recycled fibreglass or flax composite panels. The panels will be manufactured and transported flat (no need for expensive moulds). On site, they will be screwed onto a lightweight structure, made of wood or aluminium, for example.
Non-combustible panels, such as steel, concrete or fibre cement, will need to be shaped before being assembled and transported stacked on top of each other.
From an aesthetic point of view, using composite panels to clad the tower will allow us to use graphic gradients, for example, as we will be able to print on the fabric before adding the resin. We will also be able to incorporate patterns, designs, etc., as is done in the surf industry. If we want to achieve a monochrome colour, this will also be possible by using a gelcoat on the visible surface.

White tower, natural wood-coloured omegas, LED rail and blue foundation

Images & design : © Christophe GUÉRIN 2025
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Assembly



Exploded view of the tower during construction

The tower is divided into three modules, as is currently common practice. The connections between the three modules require special technical devices. First, the cladding panels must be equipped with hinges that allow them to pivot and slide outwards from the tower. The second technical device will consist of sliding the wavy beams horizontally from the outside to the inside. This can be achieved using a slide at the base and a rack at the top to slide the beams towards the centre of the tower.

Close-up view of the connection between two modules

Three-step assembly principle:
- The first step is to glue and screw the vertical beams in place.
- The second step is to insert the cross beams (horizontal slide). These will also be glued in place, and to facilitate proper connections, filtered inserts will be placed in the vertical beams. Then, once we have slid and glued the cross beams, we will screw them to the vertical beams to ensure a good glued connection.
- The final step will be to pivot the cover panels (offset hinge principle) and attach them to the vertical beams so that they are securely fastened.

Images @ design : © Christophe GUÉRIN 2025
Wind-turbine design project _ CG _ «Nourishing tower»

Fire



Details :
Close-up of the tower's base

The first 10 to 15 metres of the tower will be clad with steel panels or any other non-combustible material, such as fibre cement, ductal concrete (Lafarge ductal), etc. The plywood will also be protected by an intumescent treatment. However, in the case of a high fire risk area, we could also completely cover the base of the tower and conceal the plywood structure to ensure that the first 10 to 15 metres of the tower are completely non-flammable.

1



Front view
Three modules tower

2

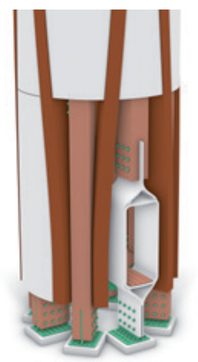


3



Detail:
As we have to cut off one leg to enter the tower, we could design a composite fibre frame, such as carbon fibre or fibre-glass, which would absorb the stress and loads. This element could also be made of steel.

The three modules are pre-assembled on site before the final assembly of the tower.



Perspective view
Detail door entrance



Artistic view of a wind turbine lit up at night

Image : © Christophe GUÉRIN
2025
Wind-turbine design project _ CG _ «Nourishing tower»

Birds issue



Photo : © Sebastian Ramirez, Ovalle, Coquimbo, Chile, 2022

Photo ci-dessous : © Razvan Mirel, Paris, Seine river, 2020





Photo : © Laura Cleffmann, Olsberg, Germany, 2021



Photo : © clarence Santos, Seoul, South Korea, 2019

As birds pose a problem for wind turbines, we suggested lighting them up. This idea arose from a mistake we make in cities. While working with an ecologist on a project, we realised that lighting bridges in cities was a mistake. This is because rivers in cities are dark corridors used by birds at night. So when we light a bridge, we cut off this dark route that animals use.

So why might lighting a wind turbine be a good idea?

Because, on a large scale, the dark corridors are located between each city, so that is where birds fly when they move around. But that is also exactly where we install our wind farms, because they cannot be located within the city itself.

The idea would therefore be to integrate a kind of radar into the tower, so that when it detects birds or groups of birds flying nearby, the wind turbine lights up to signal the obstacle in their path and help them change course or direction. The LED lights would therefore not be on all the time, but only when needed.

Equipping wind turbines with LED systems could also enable artists to create light displays. The farm would thus no longer be a simple energy production facility, but could also become a light installation at nightfall, for example for certain occasions. It could also serve as a device to show users the amount of energy produced and the intensity of the wind, a kind of data visualisation of the energy produced, which is by nature invisible.



Wind-turbine farm winding mountain road
Landscape: dominant orange/pink hue

Rendering image : © Ernesto ESTAVAVI
2025
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Original photo : © Rokas, Winding mountain road Adobe Stock _file numbre : 1243167301
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