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Recycling and end of life of wind turbines in Brazil

Voltalia reduces the environmental impact of its activities

Voltalia's operating sites are recent and therefore far from the dismantling phase. However, the company is committed to anticipating the end of life of its plants in the medium and long term. The average life of a wind farm is about 25 years. Once this period is exceeded, several solutions can be envisaged to operate the wind farm for longer:

- **Extension** : the owner can extend the lifetime by demonstrating that the turbine can operate safely for a defined period. The structural parameters, loads and safety process are checked, and a certificate is issued by regional environmental agencies such as IDEMA in Rio Grande do Norte state (INEMA in Bahia). The life of a turbine can be extended by 5 years, sometimes more.
- **Reconditioning** : old wind turbines are replaced by new ones through modernization, renovation and refurbishment.
- **Replacement** : The owner can replace old wind turbines with new ones.
- **Dismantling** : The wind farm is dismantled in accordance with the national legislation in effect.

In Brazil, the question of the end of life of wind turbines will soon be concrete since we set up our first wind farm there in 2014. Despite the lack of legal and material framework in the country, Voltalia's teams on site are fully involved on that topic and are already working about it.

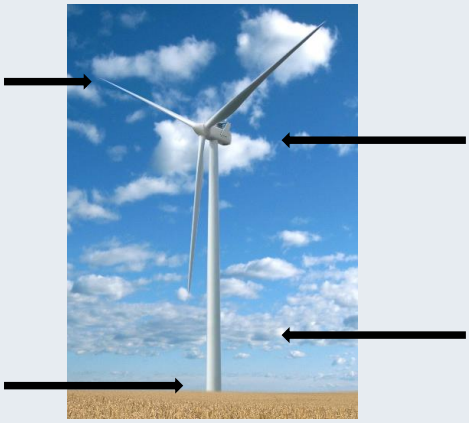
What is a wind turbine made of and how is it recycled ?

Blade

Composite materials (glass fibers, carbon, resin...): destruction of the pall in powder or fibrous strands that can be reused for the manufacture of new objects. The resin and the fiber are not separated so the quality is lower.

Foundations (steel + concrete)

Steel : separated from concrete and recycled
Concrete: reused for infrastructure construction (roads...).



Nacelle (metals + electronic components)

Metals: easily recyclable
Electronic components: difficult to recycle because of the alloys which are difficult to separate but which represent a tiny proportion compared to the volume of the wind turbine.

Tower (or mast)

In Brazil, towers were made with reinforced concrete and the recent ones are made with steel, which is more easily recyclable.

Challenges and prospects of the recycling in Brazil

Due to the lack of infrastructure and state support concerning the recycling process in Brazil, many challenges appear. The main one is to not discarded certain parts of wind turbines (especially the blades) pending their incineration as it can be the case with some of our competitors.

About our wind turbines with tower made of metal and reinforced concrete, we have different destinations, such as processing to separate steel and concrete (in which both can be recycled), use of granular concrete in roads and buildings or final destination in landfills.

To avoid this last case, we work upstream of the legislation about dismantling which is still very preliminary discussions. For now, we use as reference the National Solid Wastes Policy. Besides, technological progress are a great prospect in the work to come, especially about blades. Indeed, Vestas is currently working about a chemical process which allows to reuse the resin inside the blades.

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