



Observatoire Europe-Afrique 2030

"Value Chain" sheet

Fact sheet n°7

Electric Bike

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1. Components of an electric bike

Electric Motor

The motor consists of an electronic part that takes into account the data sent by the various sensors and electronic systems (speed sensor, control screen, etc.). The other part of the engine consists of the elements that help with electronic assistance.

Depending on the model, e-bikes can be equipped with pedal motors, in-wheel motors or friction motors.

Speed system

There are two types of systems. Derailleur drivetrains and hub drivetrains with integrated gears. Hub drivetrains offer ease of use compared to derailleur drivetrains.

Batteries

Today, the majority of electric bikes use lithium batteries. These have the advantage of not discharging very quickly. They are known for their **lightness** and energy density.

The battery of an e-Bike contains four components: the housing, the cells, the motherboard and the wiring.

The housing acts as a container for the battery. It is designed with a resinous blend. Its other task is to cushion the battery as much as possible in the event of an impact.

The motherboard contains the programming of the eBike. There is the part of the intelligence that makes the calculations to reward, in the best possible way, the assistance without affecting the autonomy of the bike.

Cells accumulate energy. They act as an energy reservoir and are assembled using precise wiring.

To store energy in cells, several technologies are available:

Lead

Widely used for car starters, wheelchairs and golf carts, lead is the oldest technology still in use. This technology is cost-effective and robust, but has several drawbacks. Lead induces a very strong memory effect, i.e. you have to wait until the battery is completely discharged before recharging. In addition, it causes self-discharge, in the range of 20 to 30% per month depending on the quality of the lead and requires a long refill time. It has a high sensitivity to cold which leads to a loss of at least 30% of the battery capacity, when the bike is exposed to sub-zero temperatures. In addition, the lifespan of a lead-acid battery is reduced in terms of the number of cycles. Lead-acid makes the battery heavier and has a reduced energy density.

Lithium

Lithium is currently the best technology on the market. It makes it possible to make small and light accumulators, with a capacity of 90-150 Wh per kg. With this kind of battery, the range of the e-bike is greatly improved. Lithium does not suffer from a memory effect. Its only downside is its high price, which is explained by the uniquely designed materials and a much more complex electronic system. A distinction is made between the lithium-ion battery, which is the oldest on the market, the lithium polymer battery, which has an energy density 20% higher than the previous one, and the lithium-iron-phosphate battery, which is not widely used, which has a very long lifespan (1000 charge cycles).

Nickel-cadmium (Ni-Cd)

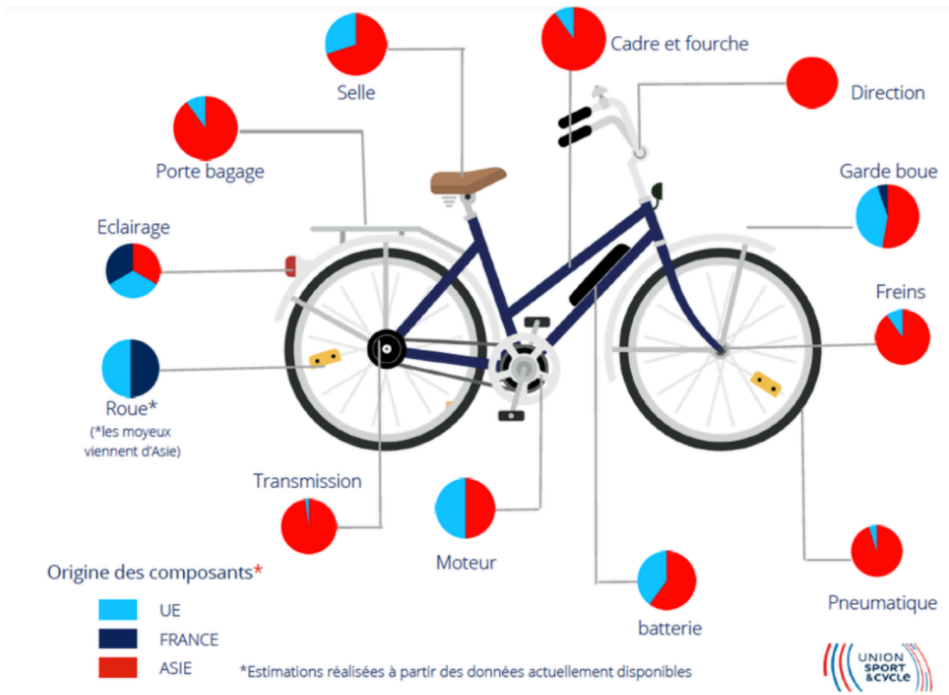
Ni-Cd batteries are very robust, forgiving, and have a significant number of charge cycles. They load very quickly. Nevertheless, they have a low power density, memory effect, and high discharge rate. They are also sensitive to sub-zero temperatures and lose capacity very quickly in the first 24 hours.

Nickel metal hydride (Ni-Mh)

The nickel metal hydride battery provides a higher energy density than the lead-acid battery. But it has a significant memory effect, a low lifespan in terms of number of cycles, a very pronounced self-discharge, a fairly long charging time and a tendency to overheat.

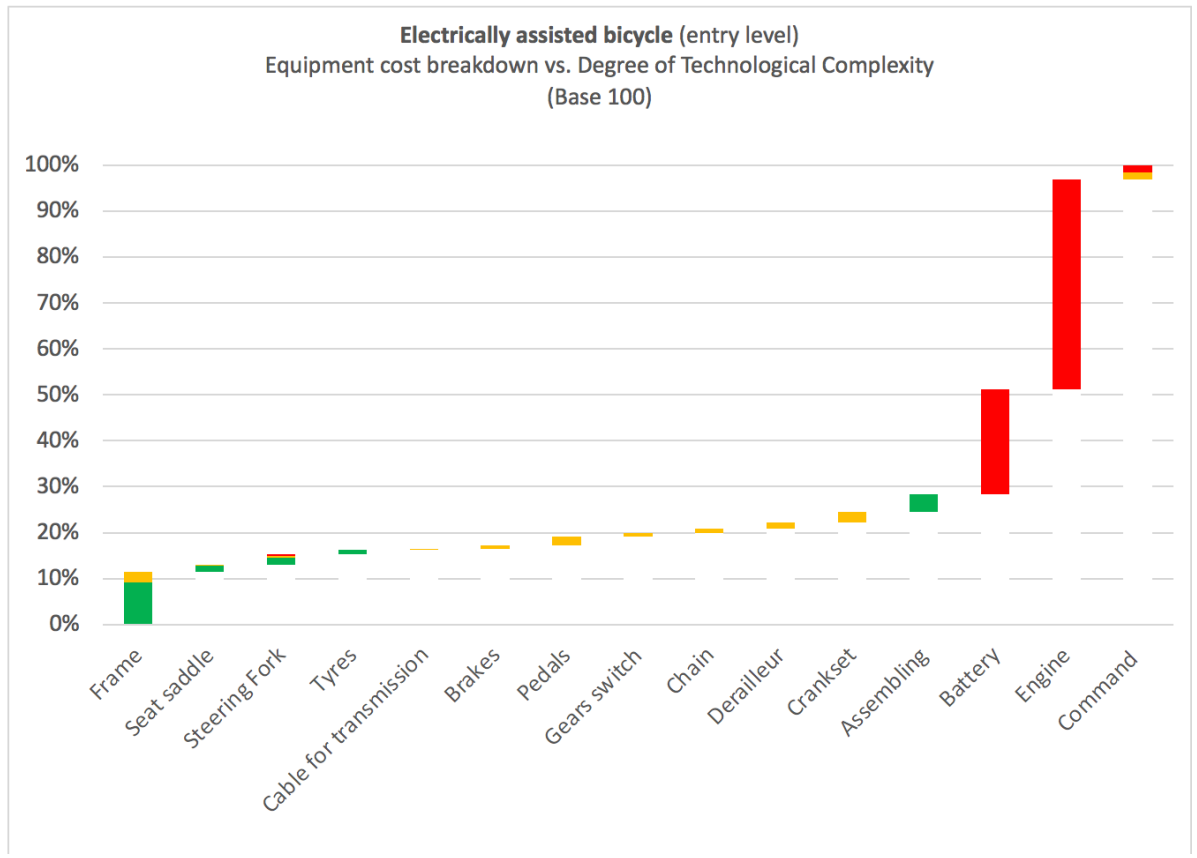
2. Geographical origin of the components

The bikes are often assembled in Europe, but the majority of the parts are still produced in Asia. The majority of manufacturers are dependent on this region of the world. The most affected components are frames, brakes, tyres, motors or derailleurs. For the latter, the world market is controlled by two companies (Shimano and Sram). The Asian continent accounts for more than 90% of the origin of its components.

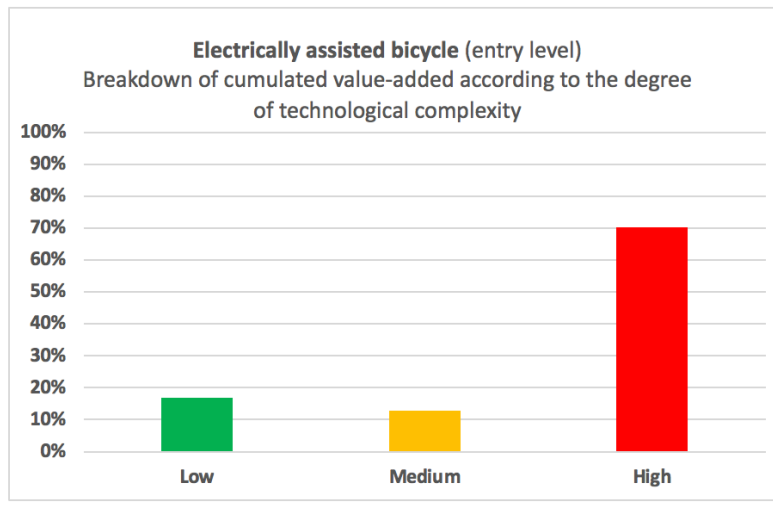


Source : Union Sport et Cycle, 2021

3. Value Chain



Source: Europe-Africa Observatory 2030. These data were estimated from bibliographic surveys. They are orders of magnitude.



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Note: With the exception of the electrical system, the components of an e-bike are, more or less, the same as for a road bike. The components of both types of bicycles are described in detail in the Fact Sheet n°3.

Battery price: €300 to €600 for standard models.

Engine price: around €600.

Control console price: between €40 and €120

4. Sources of information

<https://www.bikecenter.fr/prix-velo/>

<https://www.velobecane.com/guide-velo-electrique/composition/>