

The challenges of the automobile of tomorrow are played out in China and Africa.

*China is the key player in the automotive market of tomorrow. Not only in terms of sales volumes: the strategic choices of Chinese policies will affect the entire world market. Especially for so-called "clean" vehicles. But at what price and what consequences will ensue? **What alternative does the compressed air technology offer?***

A dynamic and changing automotive market.

In 2017, the global automotive market recorded 93 million passenger and light commercial vehicle registrations. That's 2 million more than in 2016, an increase of 2.3%.

China, the world's largest market, captures 30% of this fleet for 28 million vehicles.

After France and the United Kingdom, which promised this summer to switch to all-electric in 2040, China also **plans to ban the diesel or gasoline engines in its gigantic automotive market**. It must be said that air pollution in Chinese megacities has become unbearable.

Under the influence of their government, Chinese consumers are strongly encouraged to purchase electric vehicles. In 2016, 507,000 units were sold in China, representing 45% of global production. In 2017, sales were expected to reach 700,000 vehicles. The stated ambition is to produce more than 3 million units from 2025. According to Goldman Sachs estimates, China will absorb more than 60% of global sales, by 2030. (source Asialyst)

Beijing will require manufacturers to sell 10% electric or hybrid vehicles in 2019, a proportion that will increase to 12% in 2020. Failure to meet these thresholds, credits must be purchased from surplus competitors. By forcing the hand of the builders, the government intends to allow the market to reach a critical mass. The economies of scale thus generated should make it possible to lower the cost of batteries.

In addition to this impressive incentive, China is investing heavily in its network of electric charging stations. There are 171,000 across the country. The ambition is to have one terminal per vehicle by 2020.

Taking into account the climatic imperatives also brings a repositioning for the energy supply: **the electricity production will have to be seriously carbon-free**. To date, 67% of electricity is produced by coal plants. A significant transition is essential so that exhaust pollution is not simply transferred to coal-fired power plants. These should only represent 50% of the energy mix by 2030, thanks to massive investments in renewable energies and nuclear energy.

Pollution and geo-strategy.

Propelled by economic expansion and a very dynamic domestic market, China has good reason to liberate itself from the combustion engine and choose all electric.

Its population protests against the air pollution that suffocates the country. Gasoline vehicles are responsible for 30% of estimated impact, **due in part to the technological backwardness of this engine**.

The dependence on oil imports is also a factor of geostrategic vulnerability of which the middle empire wishes to free itself in favour of an area where it holds a quasi-monopoly: rare earths.

These minerals, amongst others uses are essential to vehicle batteries, and are mainly extracted and refined in China which controls 97% of the market.

Many **rare earth mines** have been abandoned in the West and the United States. They were insufficiently profitable and highly polluting and also faced severe social and environmental dumping from China. At this price, the middle empire now reigns supreme over the raw materials available now and in the future.

These resources are not all located on the "visible" Earth's crust, but also on the ocean floor of the Pacific Ocean, in the form of polymetallic nodules. For now, if the deposits are known, extraction is not taking place.

What carbon footprint?

The logic of the market, which often prevails as a basic reflection, is now being undermined by other modes of systemic environmental thinking. Indeed, what's the point of trying to clean up on one side what we over-pollute on the other?

If you use a non-polluting electric vehicle in the city, but the energy that is used in its power pollutes everything comes from a few tens of kilometres away, in the form of coal-fired power plants, where is the advantage? The planet is round, and pollution clouds do not stop at borders any more than those of Chernobyl.

In addition, the carbon footprint is not only comprehend according to the consumption of the vehicle, but also with regard to the whole automobile production chain and its supply of raw materials.

The electric vehicle with lithium batteries then displays no advantage, or even in the red. EVs pollute as much or more than diesel vehicles, according to a study by Ademe.

What will be the real price for the vehicle battery?

The heart of the problem comes from the battery, and this for several reasons:

Even if the technology progresses, its carbon and ecological footprint is not good and will hardly improve, except to increase the price. It is China that pays the price, in the place of Western economies, because if the standards of social and environmental acceptance were the same in China as in the West, the vehicle battery would be unaffordable.

Moreover, world demand is growing steadily, but the **resource is finite** and owned by this monopolistic giant. Logically, prices will explode in the coming years.

It will always be possible to structure means of recycling, to find other sources of supply ... Statistically, even with economies of scale, prices will not go down.

Thus, we speak of "lithium fever" to describe the exponential growth of needs and prices. As for cobalt, it follows the same frenetic logic and prices soar, reaching \$ 88,000 per tonne. (while DRC "manual miners" are paid from \$ 5 to \$ 7,000 per tonne)

The DRC may change the game.

The Democratic Republic of Congo has long been seen as a "geological scandal" as its mineral wealth is important. Until now, foreign mining conglomerates had paid 2% royalties to exploit cobalt, coltan, and other rare earths. The nation of the DRC seems to be waking up and the rate of this royalty should soon rise to 10% for "strategic" ores, the list of which is not yet determined, and 3.5% for so-called "classic" resources ". Or, for minerals that make up the composition of vehicle batteries, a purchase cost multiplied by 5.

The major challenge: an ecologically neutral energy storage.

We are facing a difficult situation to curb:

- A growing automotive market worldwide.
- A gradual and constant rejection of thermal engines.
- State incentives to buy hybrid and electric vehicles.
- Rare raw material prices increasing exponentially.
- Rare earth refining capacities that are scarce, stammering, uncertain and expensive.
- An expanding world population (over 3 billion before 2050) that will also demand to take advantage of technological developments and therefore means of transport.

The storage of energy is the major challenge of the 21st century.

To meet this in an environmentally and economically reasonable way, it must be realized without any significant ecological impact, and be economically realistic.

But also that it is part of a systemic political opinion. A subject on which Carlos Tavares, has already issued severe criticism. The CEO of PSA has said loudly: he fears that the excitement around electric vehicles will come back to face society like a boomerang. Our manufacturer does not dare to imagine his position if we had to see, in ten years, electric vehicles appear in the dock, like thermal engines today.

The current electric battery is powerful, **but fails to meet this challenge.**

COMPRESSED AIR TECHNOLOGY is one of the best possible solutions because its carbon footprint is optimal, its reservoir is chemically inert and its very reasonable cost makes it possible to optimize energy production resulting from sustainable development.