

**Towers & Conductors works synchronization**

Asset management, is one of the key subjects for RTE, French Transmission System Operator (TSO). The overhead power line asset base is getting older. As an example, the average age of RTE’s lattice towers made with black steel is around 70 years old and RTE now has some obsolescent (non-reparable or non-maintainable) conductors. Moreover, RTE will face a wave of replacement of ACSR conductors and tower from 2040 since all the networks was built at the beginning of the 50’s. That’s why RTE must reconsider its actual strategy of asset management to take into account all these new points.

RTE used to have a strategy of local optimization. This was the historical approach used by RTE when the grid was pretty young and in constant evolution and this strategy has been kept as part of RTE’s culture. At that time, the number of replacements due to obsolescence was quite low so the solution was to limit the replacement in each case, in particular for lattice towers and to try to repair them. The outcomes of these interventions is a heterogeneous network, a complexity of maintenance, and a multiplication of small operations.

Now it can be said that this strategy arrived at its end. Indeed, TSO are one of the main actors in the energy transition, and they have to face new issues: energy and financial sobriety! This objective is hard to reach in the context of the development of new ways of energy production and a growth in consumption. The aim is now to reach a global optimization for the network. To succeed, RTE relies on technical-economic studies.

Behind this approach of global optimization, the focus is on the all-assets lifecycle. So, we compare two different strategies: the historical one with local optimization and a new approach with synchronization of towers and conductors works for every line needing refurbishment.

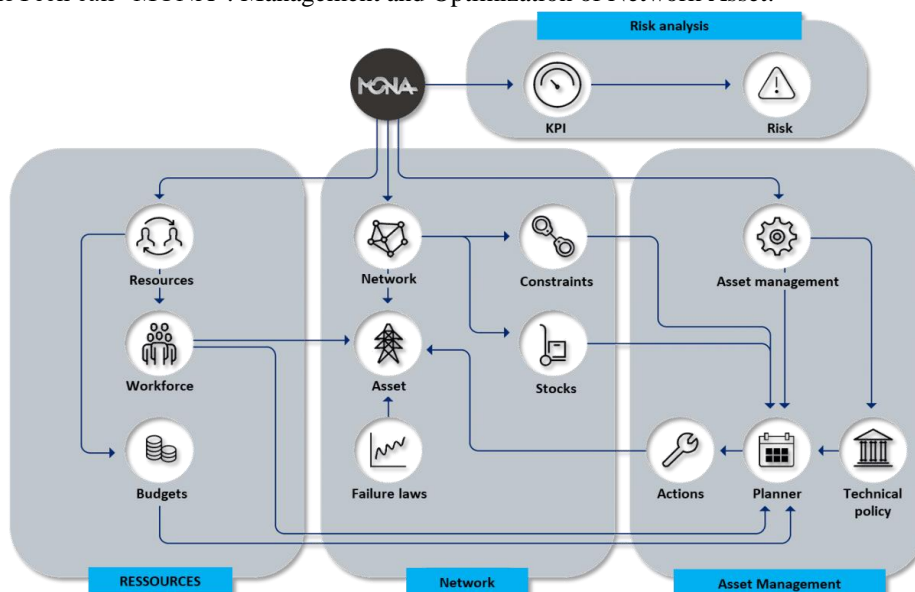
We have already described the historical strategy. The towers and conductors works synchronization strategy promotes the total replacement of the electric line in case of intervention for obsolescence. This means that:

- In case of replacement of the conductor: all the towers of the same age or older will be replaced
- In case of replacement of the towers: if the conductor has the same age, it will be also be replaced

This strategy will lead to bigger works, some conductors and towers will be replaced before their life expectancy, but the gain will be less heterogeneity in the network and easier management of assets in the future.

RTE compared these two strategies taking into account a maximum of parameters: environmental impacts, Capex, Opex, human resources, number of operations, third-parties impact, network congestion...

To compare these two solutions, RTE used a software developed in collaboration with a French start-up named CosmoTech call “MONA”: Management and Optimization of Network Asset.



This software allows to create a numeric twin of the network. So, it's possible to simulate the impact of both strategies on the asset pool, and analyze the aftermath in 10, 50, or 100 years.

The conclusions of the studies can be summed up in two main points:

- Carbon footprint impact: the strategy of towers and conductors' synchronization leads to way better results in terms of energetic sobriety. Indeed, synchronization allows to decrease drastically the number of operations under RTE line's for maintenance and renewal works which means:
  - o Use of less raw material for tower works
  - o Use of less raw material for facilities (tracks, paths for trucks, etc...)
  - o Limit the impact in protected areas

Synchronization gives also more flexibility regarding the kind of new conductor that can be used for refurbishment (there is no more limitation linked to the mechanical resistance of current towers because they are replaced). Thanks to that RTE can choose conductors with lower electrical resistivity and thus reduce the volume of joules losses.

- Financial impact: the strategy of tower and conductors synchronization leads to many cost reductions:
  - o Reducing works cost:
    - some operations can be grouped (facilities, removal...)
    - fixed costs are then reduced too: living base, congestion cost ...
    - less maintenance will be required compared to a strategy where towers or conductors would have been kept alone
  - o Economies of scale: biggest project leads to better negotiations with suppliers and less human resources cost.
  - o Reducing general Maintenance cost: Less heterogeneity means a better organization for maintenance.

At least to conclude it can be said that RTE should change in the short term change its overhead power line asset management strategy which will lead to some changes. The direct impact in terms of carbon footprint will be important. Moreover, this strategy will permit to open a lot of new subjects to go further like the development of standard solutions. Standard solutions will give more visibility to RTE suppliers, it will encourage exchanges to reduce the footprint impact of the raw materials used for works (recycled steel, low carbon concrete, etc...)