

IN PRACTICE

RTE ASSET MANAGEMENT APPROACH

RTE is one of the largest high and extra-high voltage electricity transmission networks in Europe. It is also among the most advanced in terms of thinking about asset management strategy and the use of simulation. Since 2015, RTE teams have been using Cosmo Tech Asset Simulation Twins to transform their approach to asset investment planning and optimize network maintenance and investment.

Two key steps have enabled RTE to concretize their new approach: the definition of the 2020-2035 investment plan, the 15-Year Network Development Scheme (SDDR), and then that of the 2021-2024 electricity tariff case (TURPE6). Derived from the budget trajectories presented in the SDDR, the tariff case is, in practical financial terms, approximately 90% of RTE's revenue. As a result, making a well-supported and argued SDDR and tariff case is essential to the continued management

RTE Key figures

105,000 KM
of high-voltage
lines

220,000
metal lattice
towers

9,397
employees
including

50 YEARS:
average age of
the fleet, a state
of aging and an
acceleration of
obsolescence for
some assets

€1,3 BILLION
annual
investment
budget (CAPEX)
in the network

Meeting the challenges of tomorrow's network requires massive investments today. We must have visibility of the impact of our decisions both short-term and long-term in order to direct these investments. It is also essential to know if the choices we make are robust in the face of some potentially very different evolutionary scenarios. Cosmo Tech's Simulation Digital Twins allow us to do that.

Jean-Louis Muscagorry, RTE's Project Director of Asset Management 2025.

HOW RTE CHANGED THE CONVERSATION ON ENERGY TRANSMISSION ASSET MANAGEMENT

In 2014, RTE's R&D team shared a conviction: traditional asset management approaches will not be sufficient to cope with the aging network and the increasing complexity of its business environment.

"Our asset management choices determine the network's ability to meet tomorrow's challenges. We acknowledged at that time that traditional methods based on norms were not effective to know the long-term impact of our choices" explains Serge Blumental, head of RTE's R&D asset management program.

Re-questioning its practice, RTE transformed its asset management approach by relying on Cosmo Tech technology. With their 30 years of experience in simulation, RTE's teams were convinced that complex system simulation could help them to overcome the limits of traditional methods and take into account the complexity of their short and long-term issues.

In 2020, the French regulatory authority confirmed RTE's approach, as Thierry Wourms, RTE's head of Asset Management team, and Philippe Claude, R&D asset management expert, explain.

THE FOUNDATIONS OF THE APPROACH

Two goals helped RTE to structure their new approach and guided their technology choice:

- They wanted to enable a short and long term holistic view of the asset management strategy and operations, considering maintenance and renewal interactions, integrating all stakeholder values, resources, and constraints involved.
- They wanted to support a transparent discussion around the scenarios they assessed, showing causality, chains of events, and allowing both fine grained focused analysis and macro KPI assessment to quantitatively support conversations with stakeholders.

"At the core of our approach there was the will of the company to re-question itself on its asset management and its transformation. Cosmo Tech's Simulation Digital Twins were a key tool to lead this reflection," says Wourms.

Able to represent the behavior of an organization and its evolution over time, Cosmo Tech Asset Simulation Twins allowed RTE teams to have better knowledge of their network.

| *“As soon as we integrated our data we saw things appearing”* said Claude.

By testing uncertainty, RTE was able to identify the sensitive levers that have the most impact on the network, and decide on additional investments accordingly.

| *“Simulation has accelerated decision making. For example, it confirmed our need for a tower diagnostic plan worth 3 million euros,”* he explained.

The use of long-term simulation for strategic studies reinforced RTE's approach.

| *“The simulations clearly showed us what the impacts would be if we did not react,”* said Wourms.

Decision-makers and field experts came to two conclusions:

- 1.** Without a change, the aging of assets accelerates over time. It represents an investment wall that will grow from 0,5 to 1 and then to 2 billion euros in 30 years time.
- 2.** By taking a de-siloed approach to asset management, optimization paths can be identified to both slow the growth of this investment wall and strengthen the performance and robustness of the network.

CHANGING THE CONVERSATION

With its new approach, RTE changed the conversation about asset management both internally and with its regulator, the “Commission de Régulation de l’Energie” (CRE).

RTE shared its method with the CRE when validating its 15-year business plan known as the SDDR, and again when making its tarif case. Two asset management plans produced for the SDDR (the Tower Anti-Corrosion Plan and the Gas Insulated Substation Plan - see overleaf), allows RTE to illustrate, explain and justify its simulation-based approach.

| *“We had two needs: first, we needed to justify our budget trajectories and the staffing for asset renewals, and second, we needed to be able to be robust when it came to aligning the budget with the volume of the work we proposed,”* explained Claude.

| *“Above all, we needed to illustrate how a short-term action could obtain tangible results in 10, 15, or 20 years.”*



RTE prepared a presentation of their Asset Simulation Twin for CRE, providing strong, demonstrative proof to support their plan.

“We initially presented some fairly global contextual elements such as the challenges of asset management and the principles of modeling and simulation giving a global view of the capabilities of Simulation Digital Twins “ said Claude.

RTE focused on the cost and benefits of asset renewal, explaining that it might be possible to avoid or postpone renewal investments thanks to appropriate and consistent actions, including painting of towers.

RTE was able to demonstrate that expenses for tower refurbishing could be avoided if investments in painting were made at the right time, in the right amounts, and with the right scope. This approach requires a robust model of the overhead line lifecycle, composed of the corroding steel lattice, painting with chemical properties and protective relationship to the tower health. In addition, there was a modelling challenge to connect the physical degradation model with the asset lifecycle financials.

“We could show the regulator that we could spend more in the short term painting the towers to maintain and extend their life cycle, and recover the investment – and more – over the long term by not having to replace the aged towers,” explained Claude.

The Asset Simulation Twins allowed RTE to test different lattice tower management strategies and choose the one with the highest potential for long-term economic gain.



AN ENHANCED DIALOGUE WITH THE REGULATOR

RTE leveraged their Asset Simulation Twin to enhance their dialogue with the regulator.

They demonstrated their holistic vision for asset management and asset investment, demonstrating the impacts on and contributions of changes in technical policies on the network and the control of long-term investments. Together they questioned the OPEX/CAPEX balance that had been in place for several decades.

RTE was able to show the expected gains of the proposed approach by comparing the results of different scenario simulations and the regulator understood not only the impacts of the proposed strategy but also the reasons behind the requested spend.

Sharing objective data showing that increasing the maintenance budget would lead to substantial savings in the medium term, the regulator granted RTE a 15% increase in their total OPEX maintenance budget. This approach allowed the CRE to grant a 100% increase in the budget allocated to the painting of lattice towers over the next tariff period and even a 100% increase more over the following tariff period 2025-2028.

Indeed, so convinced was the CRE with RTE's new approach based on AI-Simulation Twin, in its public report, it requested that RTE "apply this approach to all its policies for renewal of assets (disconnectors, transformers, conductors, etc.)"

In transforming its asset management practice, RTE not only made a commitment to transparency but also enhanced dialogue with stakeholders like CRE. RTE was able to showcase its plan, explain all of the functional capabilities of the Asset Simulation Twin, communicate all of the simulation results, and fully explain its rate case clearly and holistically.

TOWER ANTI-CORROSION PLAN

Initial Objective:

Define the budget trajectories of painting, refurbishment and replacement of lattice tower expenses, to prevent premature aging on overhead lines, especially in coastal and polluted areas.

Long Term Objective:

Maintain the quality of service at the lowest cost.

Asset Simulation Twin in Action:

Simulate several different repainting, refurbishing and replacement strategies to obtain the best OPEX / CAPEX balance.

Results:

Confirmed a necessary increase in painting expenses, **+100% between 2021-2024** and **+100% more from 2025**. Without this change in strategy, RTE could show that there would be an increase in maintenance expenses of **€700 million by 2050**.

GAS INSULATED SUBSTATION PLAN

Initial Objective:

Compensate for the degradation of sealing in gas insulated substations in order to limit both the environmental risks of a sulfur hexafluoride (SF6) gas leak, and security of supply risk of component failures.

Asset Simulation Twin in Action:

Simulation and testing of the different maintenance and renewal strategies for the substations.

Results:

Confirmed the need to accelerate the implementation of the gas insulated substation rebuild plan for **630 million euros by 2035**. This investment would deliver an environmental dividend in the shape of a reduction of nearly 13 tons of SF6, the equivalent of a reduction of more than **300,000 tons of CO2**.

RTE ASSET SIMULATION TWIN BY THE NUMBERS

Integrating all of RTE's business knowledge and expertise, the model is the most complete and accurate model of a national electrical transmission network ever developed.

1M

assets components
integrated in the
Digital Twins

30M

planned
operations per
scenario

30 to 100

years
time
frame

Daily use