Le réseau de transport d'électricité

Partnering for a Circular and Resilient Grid with Recycled Aluminium

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RTE, the transmission system operator in France

Key figures

105 817 km of high and very high voltage electrical lines, the biggest european grid

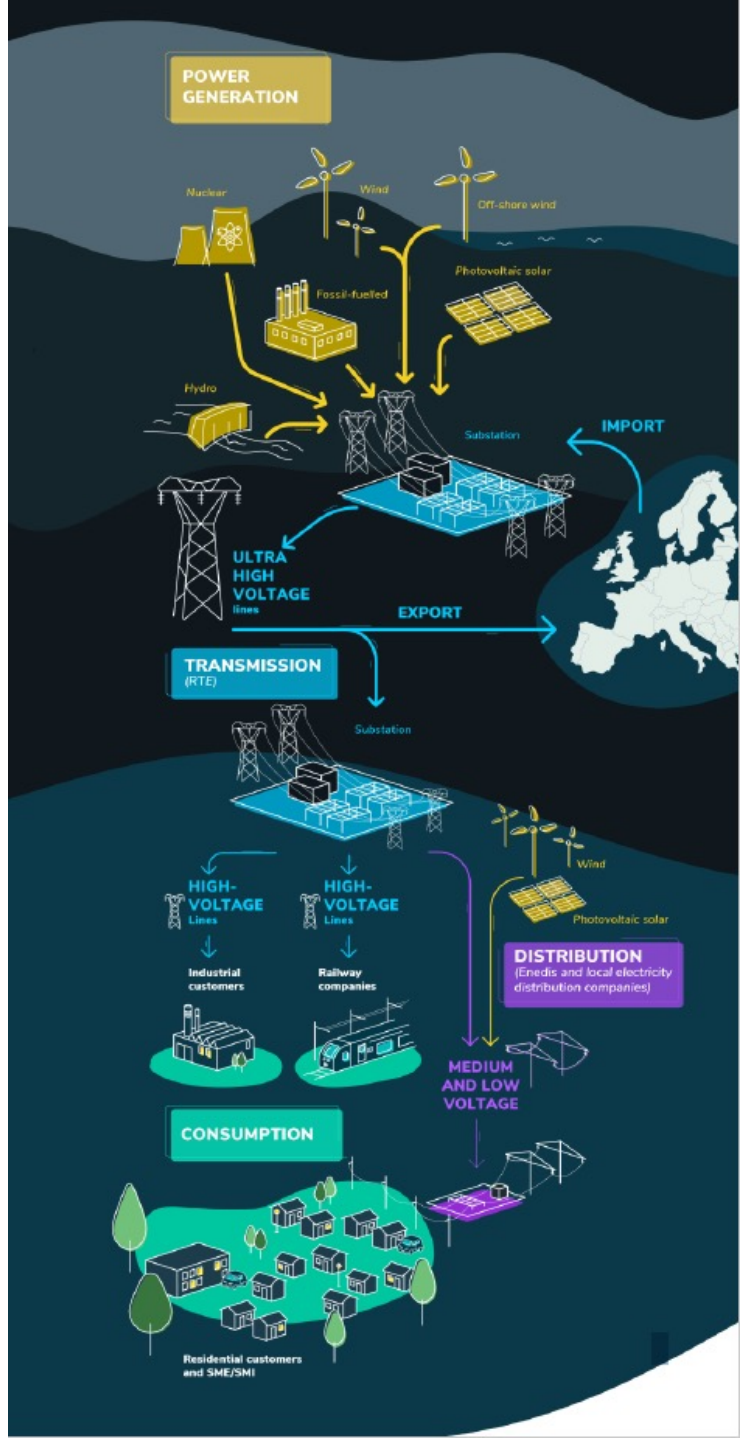
5 559 M€ revenue in 2024

99,9995 % continuity of power supply

40 M€ annually allocated to R&D

10 025 employees

91 % customer satisfaction in 2024



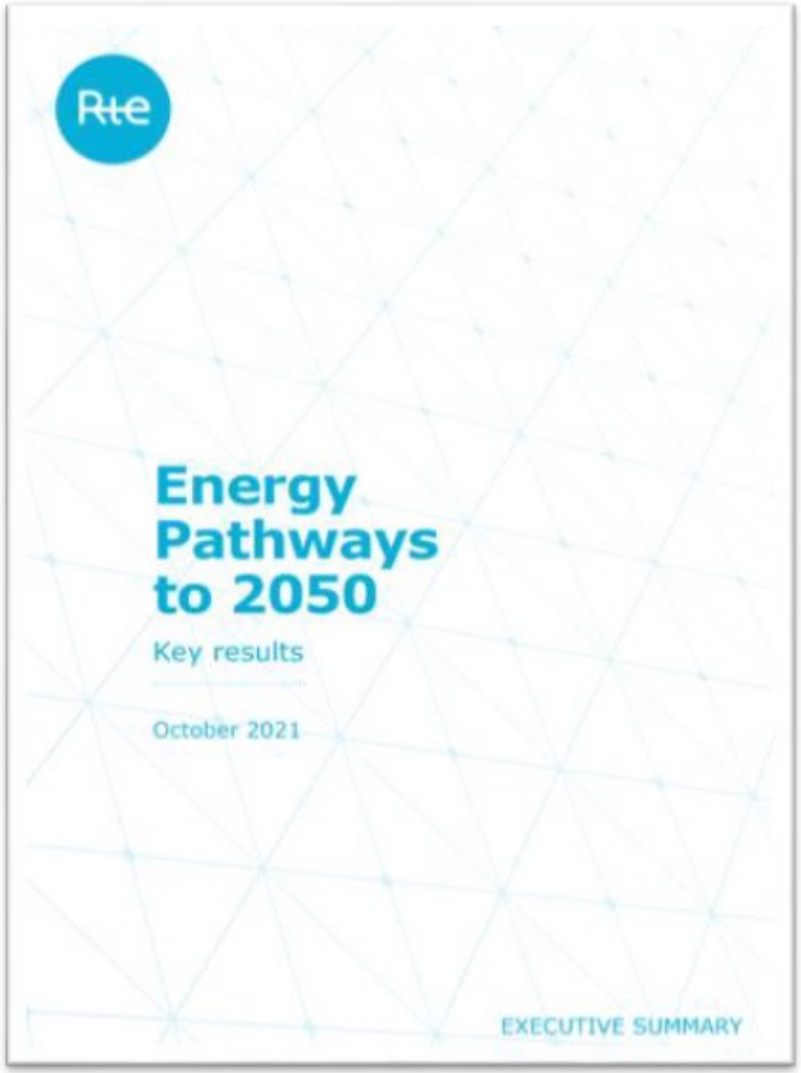
Energy Pathways to 2050: Key findings

Environmental dimension

Mineral resource supply may face tension in the energy transition, especially for key metals, requiring careful planning

- Transitioning away from fossils fuels increase the need for new mineral resources and supply chains
- Criticality issues for necessary resources vary, including limited reserves, monopolies, conflicts of use and economic importance, substitutability, environmental impacts, etc.

RTE's strategic environmental plan 2022



RTE’s Circular Economy Action Plan 2023

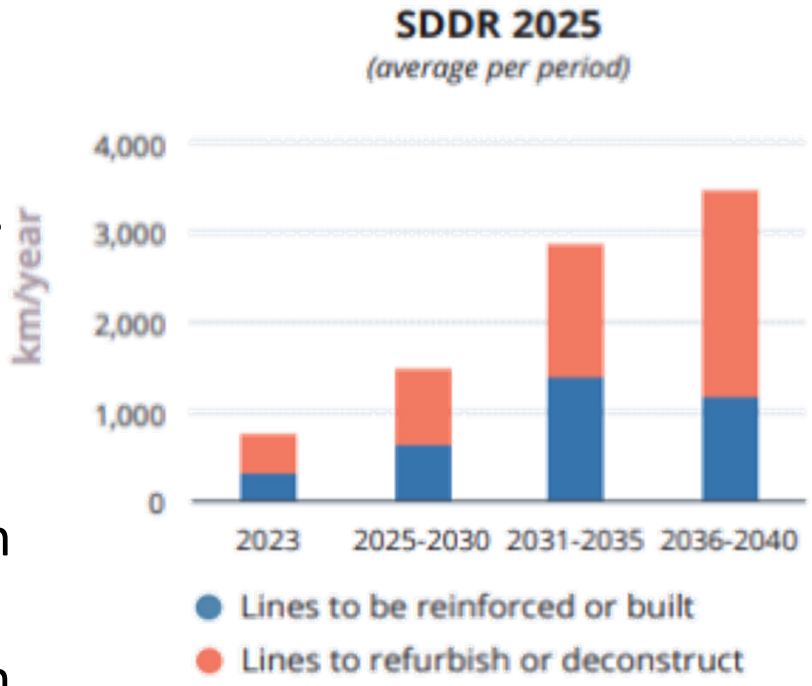
RTE is now intensifying its efforts and scaling up by developing a circular economy action plan 2023 - 2030 based on key major actions

- Embedding circular economy principles systemically: integrating circular economy into contracts, accounting, knowledge, metrics, and culture
- **Recycling steel & aluminum for pylons & cables**
- Recycling copper from underground lines
- Taking action on the lifecycle of key equipment components
- Reusing materials from construction sites & decommissioned assets
- Formalizing the waste management plan in accordance with the green taxonomy

Aluminum overhead lines cables context

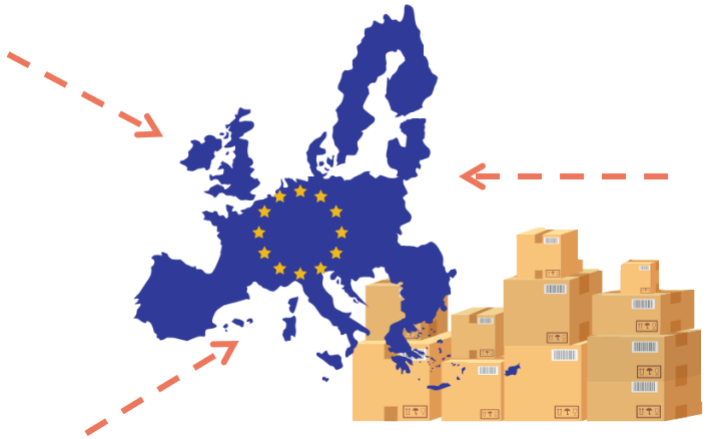
Start of a period with huge amount of grid works

- Three times more electrical cables needed in the next 15 years.
- Similar increase of old overhead line cables refurbishment.



Existence of supply risks

- The EU is only 10% self-sufficient in bauxite and 49% in aluminum production.
- While 76% of aluminum cans are recycled in Europe, aluminum from decommissioned overhead lines is rarely reused to make new conductors (downcycling).



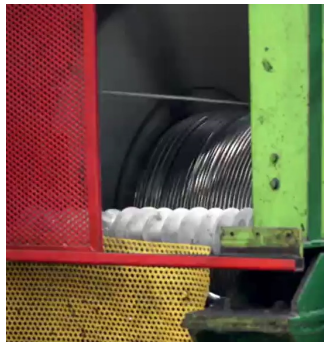
Need for a more sustainable aluminum production

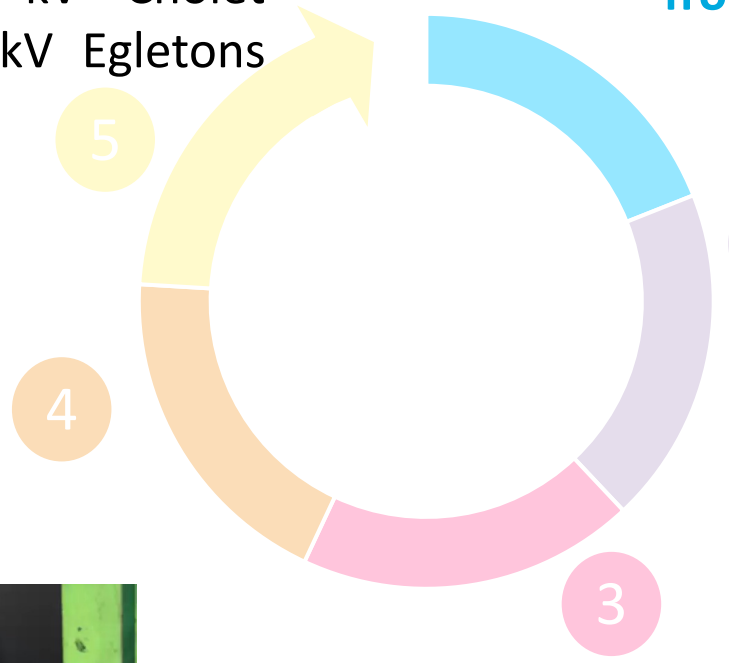
- High energy consumption for primary aluminum production
- 3% of worldwide CO_2 emissions come from Al production

2021 – 2023 : overhead line cables circular economy trial

Installation of new AAAC cables containing part of recycled almélec on RTE network (225 kV Cholet Distré and 90 kV Egletons Naves Eyrein)

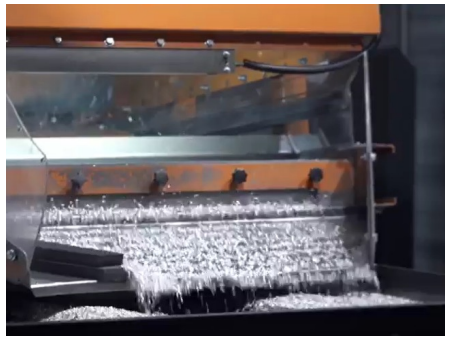
Overhead Line Cable containing recycled content production by *Nexans*





Removal of 40 km of AACSR cables in Maurienne valley from old RTE overhead lines

Recycling by *MTB Recycling*: degreasing, steel-aluminum separation, aluminum cutting



Aluminum foundry by *Trimet* : reuse of almélec material to product a new machine wire

Circular Economy trial successes

- ✓ Recycled overhead lines cables match mechanical strength and electrical conductivity with conventionally manufactured cable.
- ✓ Producing a recycled overhead lines cables needs circular economy due to the required high purity of aluminum material for electrical application
- ✓ Lower emissions : recycling 1 ton of aluminum cuts 7 tons of CO_2 vs. producing primary aluminum
- ✓ A collaborative work : RTE , MTB, Trimet, and its supplier teamed up to recycle aluminum for the grid

What’s next ?

Next main challenge : scale this breakthrough.

With growing industrial capacity and strong alignment among stakeholders, RTE is now working to make recycled aluminum conductors the new standard, supporting a grid that is both sustainable and resilient.

RTE own objective

Up to 30%

The proportion of recycled aluminium in conductors (technical feasibility confirmed, scaling up depending on suppliers’ commitment)

Next steps :

- **develop an industrial ecosystem**

able to handle large volumes of recycled material, including manufacturers, recyclers and refiners, currently limited in number.

- **specify correctly the new installed cable**

not releasing the quality level of electrical cables due to recycled content, knowing how to specify/control the recycled content, asking the correct value of recycled content (not to low, not to high)

Summary

- ✓ **Circular economy trial succeed** to install on the grid overhead line cables with recycled content and same mechanical strength and electrical conductivity as a conventionally manufactured conductor, but with a significantly lower environmental footprint.

- ✓ **The project's success lies in the collaboration it fostered across the value chain**: dismantling and recycling to remelting, and manufacturing.

- **Present opportunities on the European industrial ecosystem to change scale** :
  - Lack of industrial specialised recycling bases
  - Lack of aluminum machine wires founders
  - Limited electrical cables production

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Thank you !