Le réseau de transport d'électricité

Renewables Grid Initiative

Installation of a Recycled Aluminium Alloy Conductor on RTE's Grid

27th May 2026

RTE in figures…

Europe's first transmission system operator in terms of grid size and investment

- **105,797 km** of power lines and **2,842** substations currently in operation
- **25,500 km** of optical fibers
- **37** cross-border connections

RTE in figures…

Europe’s first transmission system operator in terms of grid size and investment

- **€ 6,131 M** in sales
- **€ 40 M€** annually committed to R&D
- **€ 110 M** of capital expenditure committed to interconnections
- **10,025** employees including 507 apprentices

RTE in figures…

1,282 customers

- **11** railway companies
- **391** market players
  (balance responsible entities, adjustment actors, demand-side response operators, obligated parties or capacity-mechanism certification entity holders, etc.)
- **429** industrial consumers
- **317** power producers
- **134** distribution companies
  (Enedis and tier-1 local distribution companies)

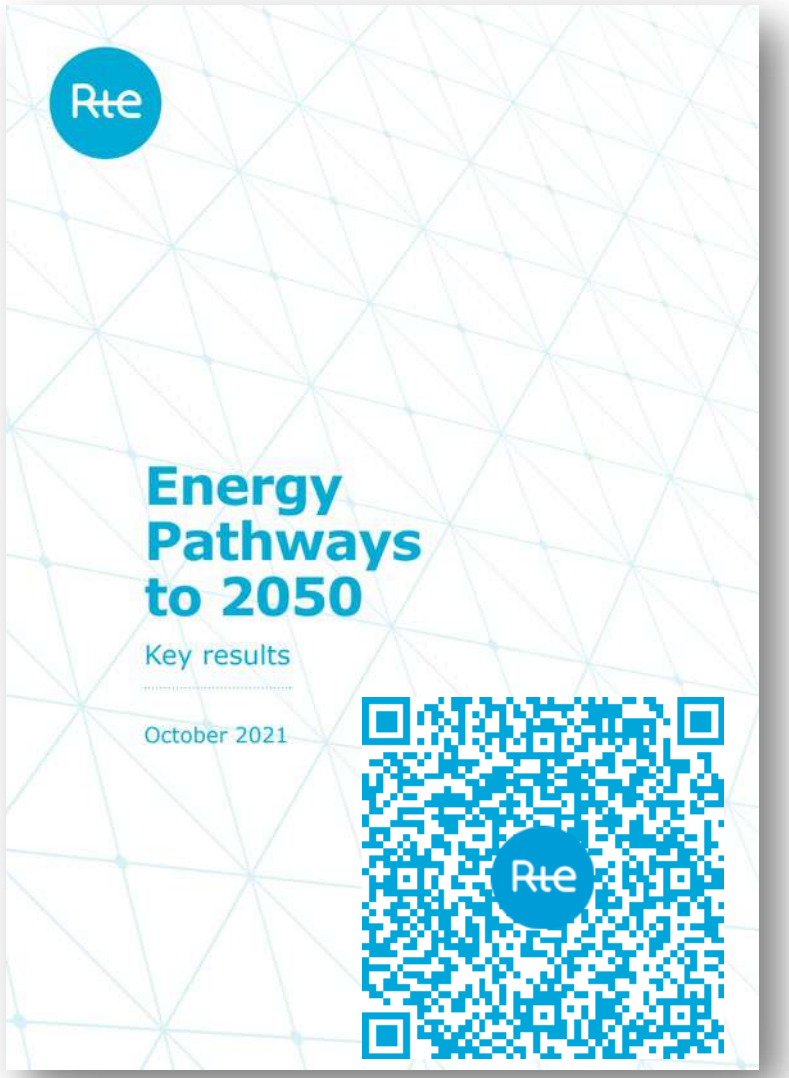
Our missions

OPERATING THE POWER TRANSMISSION SYSTEM
by innovating and transforming our industrial infrastructure for the benefit of our customers and local communities.

OPTIMIZING THE FRENCH ELECTRICITY SYSTEM
by combining efficiency, energy solidarity and environmental protection.

INFORMING THE PUBLIC DECISIONS
and choices made by local authorities and citizens, through our expertise and sense of anticipation.

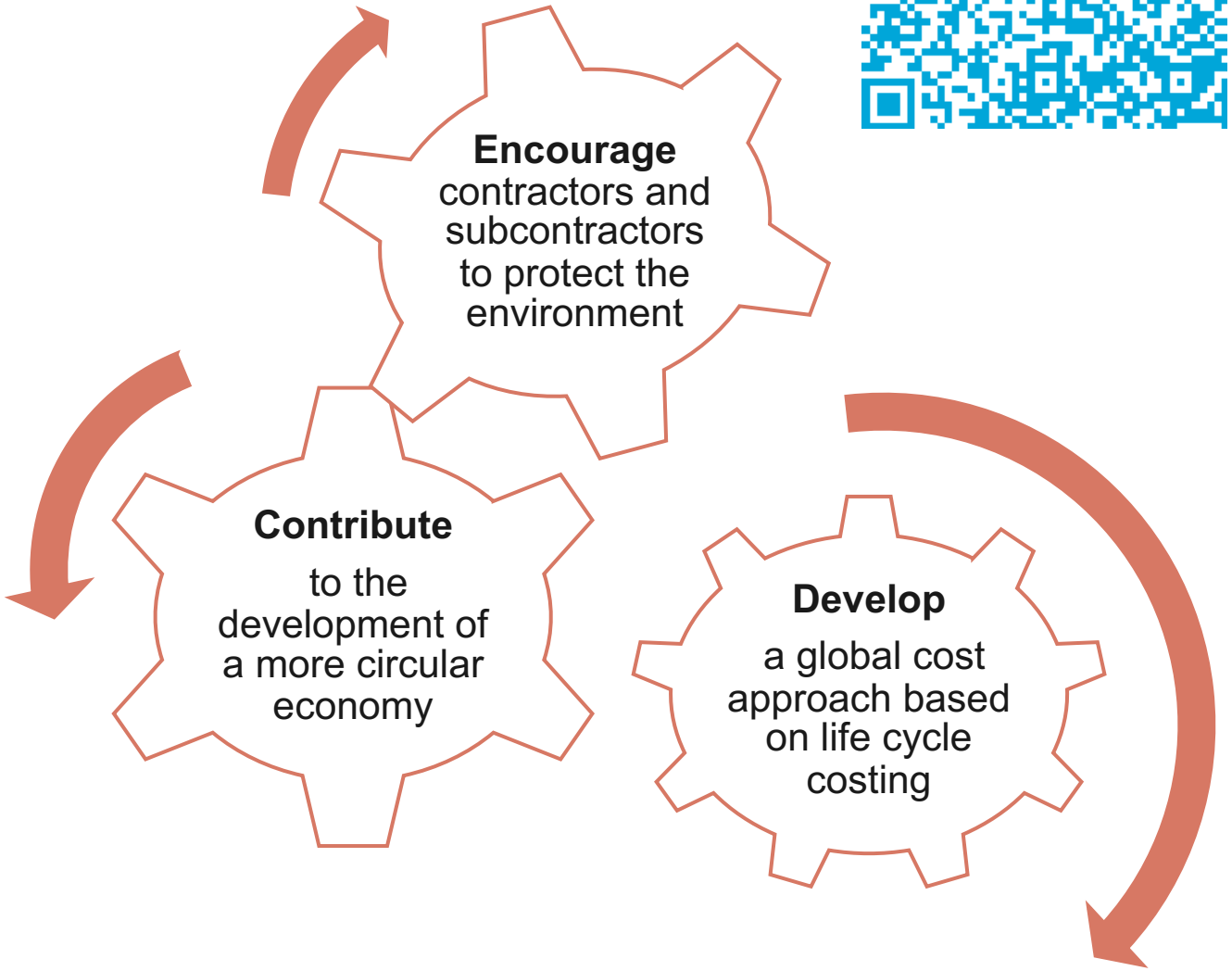
RTE's Energy Pathways to 2050 Report : Key Findings



Environmental dimension

- There may be **tension around mineral resource supply** in the energy transition economy, particularly for **certain metals**, and it will be necessary to **plan accordingly**
- **Transitioning away from fossils fuels** will also **create a 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.

The Greener Choice



Advancing Sustainability and CSR in Procuremment: A Collaborative TSO Perspective

The Greener Choice

- ✓ A Joint Call for Action to promote more sustainable manufacturing, services and logistics along their value chain

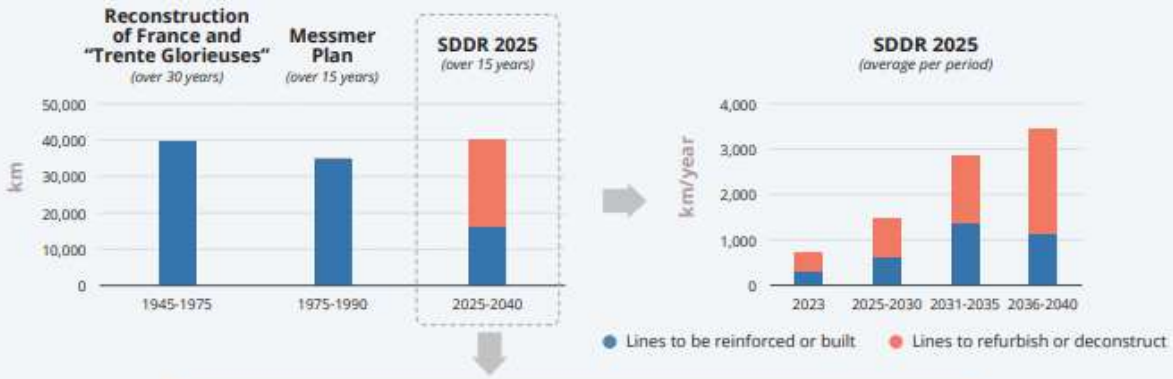
Initiative Green Technologies for the Grid, CSR criteria, sustainable solutions and circular economy

- ✓ Explore and promote shared approaches on sustainable procurement

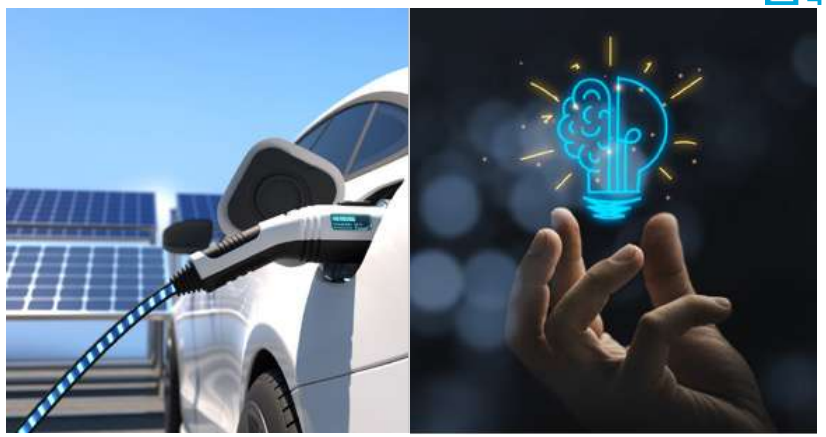
- Encourage suppliers to develop sustainable and circular solutions
- Drive decarbonization and social responsibility in value chain

RTE's Strategic Development Plan (SDDR)

INDUSTRIAL EFFORT



40,000 km
of lines requiring work by 2040 (60% to be refurbished and 40% to be reinforced or built)



ENVIRONMENTAL STRATEGY

30%
The volume of onshore lines **avoided** by 2040 in the SDDR (compared with a non-prioritized, non-optimized strategy)

=
Relative stability of the number of rows of pylons

-55%
Lower SF_6 emissions (due to the substations renewal policy)

0
flail mower use during springtime under the lines as of 2029 (compared with 2,600 ha today)

Up to 30%
The proportion of recycled aluminium in conductors (technical feasibility confirmed, scaling up depending on suppliers' commitment)

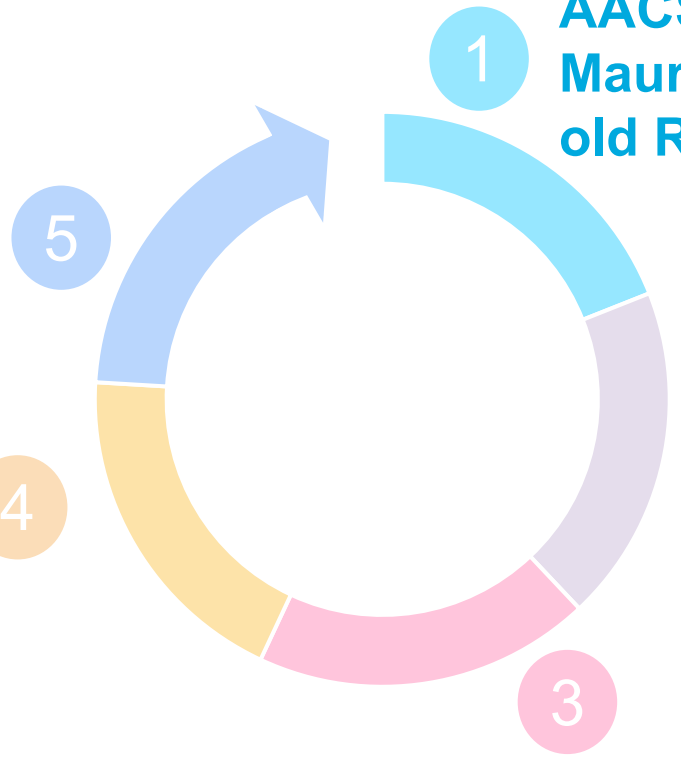
6
The number of experiments underway or planned on aluminium, copper and steel recycling (open and/or closed loop)

Installation of a Recycled Aluminium Alloy Conductor on RTE's Grid, 27th May 2026

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: Key Successes

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

RTE Cverhead Line Cable Technical Specification

- RTE main new overhead line cable technology : aluminium-magnesium-silicium alloy (AAAC)
- Standard **IEC 62641** « Overhead line conductors – Aluminium and aluminium alloy wires for concentric lay stranded conductors »

“The wires shall be of the required composition to achieve the mechanical, electrical and thermal-resistant (if required) properties specified hereinafter. »

- Maximum allowable resistivity

Table 1[a] – Designation and properties for calculation purposes[b]

Designation[c]		Maximum resistivity at 20 °C		Mininum conductivity[d]		Constant-mass temperature coefficient of resistance at 20 °C
IEC	CENELEC	nΩ·m		% IACS		10^{-3}/°C
	AL4	32,900[e]	32,600[f]	52,4[e]	52,9[f]	3,60

- Tolerance on wire diameter

Table 2 – Tolerance on wire diameter

Nominal wire diameter mm		Tolerance mm
Over	Up to and including	
--	3,00	±0,03
3,00	---	±1 % of diameter

- Minimum mechanical properties

Table 3 – Minimum mechanical properties for Ax and ALx wires

Designation[a] ---		Nominal wire diameter mm		Minimum tensile strength		Minimum elongation after break
IEC	CENELEC	Over	Up to and including	MPa		%
	AL4	1,50	3,50	325[b]	342[c]	3,0
		3,50	5,00	315[b]	330[c]	3,0

Circular Economy Does Not Compromise AAAC Quality

- **Risk** : using recycled materials introduces non-aluminium elements, increasing OHL cable resistivity or reducing mechanical strength

- **Suppliers have different possibilities to adjust OHL cable properties :**
  - Selection of material (recycling dependant)
  - Adjustment of cross section (existing tolerance in the standards)
  - Performing additionnal heat treatment

- **RTE quality feedback on last ten AAAC cables productions without circular economy** (different suppliers) :
  - Each production meets RTE specifications for « electrical quality » (verified by DC resistance measurements)
  - Mean value : 1.3% below the maximum limit
  - Standard deviation : 0.9%

  → Existing margin

→ Suppliers have solutions to mitigate the possible negative effects of recycled materials to ensure cables quality.

Main Takeaway

- ✓ Circular economy on aluminium …
  - … is a way to reduce european material dependency on aluminium
  - … has beneficial effects on CO_2 emission

- ✓ Technical specification on aluminium alloy overhead line cables can be maintained with recycled content.

- Circular economy success lies in the collaboration it fostered across the value chain: dismantling and recycling to remelting and manufacturing

What's Next ?

Strengthen Supply Chain Resilience

- Improve **understanding of value chains** (e.g. copper, aluminum, steel) to identify vulnerabilities and mitigation opportunities

Accelerate Circularity in Grid Equipment

- Develop **more circular and resource-efficient components** to reduce dependencies and vulnerabilities
- Use IEC 63366:2025 as a basis for LCA and to define **product-specific rules (PSRs)**

Build Industrial & Recycling Capabilities

- Establish **strong industrial capacity** for processing and recycling grid technologies (in view of increasing decommissioning)
- Promote **high-value recycling** and prevent downcycling

Foster Ecosystem Collaboration

- Strengthen **coordination across the power grid value chain**
- Enable joint development of **recycling and processing capabilities**

Thank you

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