



INTERNATIONAL UNION
OF RAILWAYS

Rapid overhead contact line renewal systems Conference

WELCOME



9:30 AM - 10:30 AM:
The Industrialization of Regeneration

Matthieu Chabanel, CEO, SNCF Réseau

Patrick Jeantet, President, Rail Industries Federation (FIF)

Romuald Hugues, President, TSO

Hervé le Joliff, President, Colas Rail

**Jean-François Milleron, Managing Director France & Europe,
Colas Rail**

Didier Stainmesse, President, Novium

Nicolas Yatzimirsky, President, Geismar

Break time



**11:00 AM - 11:45 AM:
The Genesis**

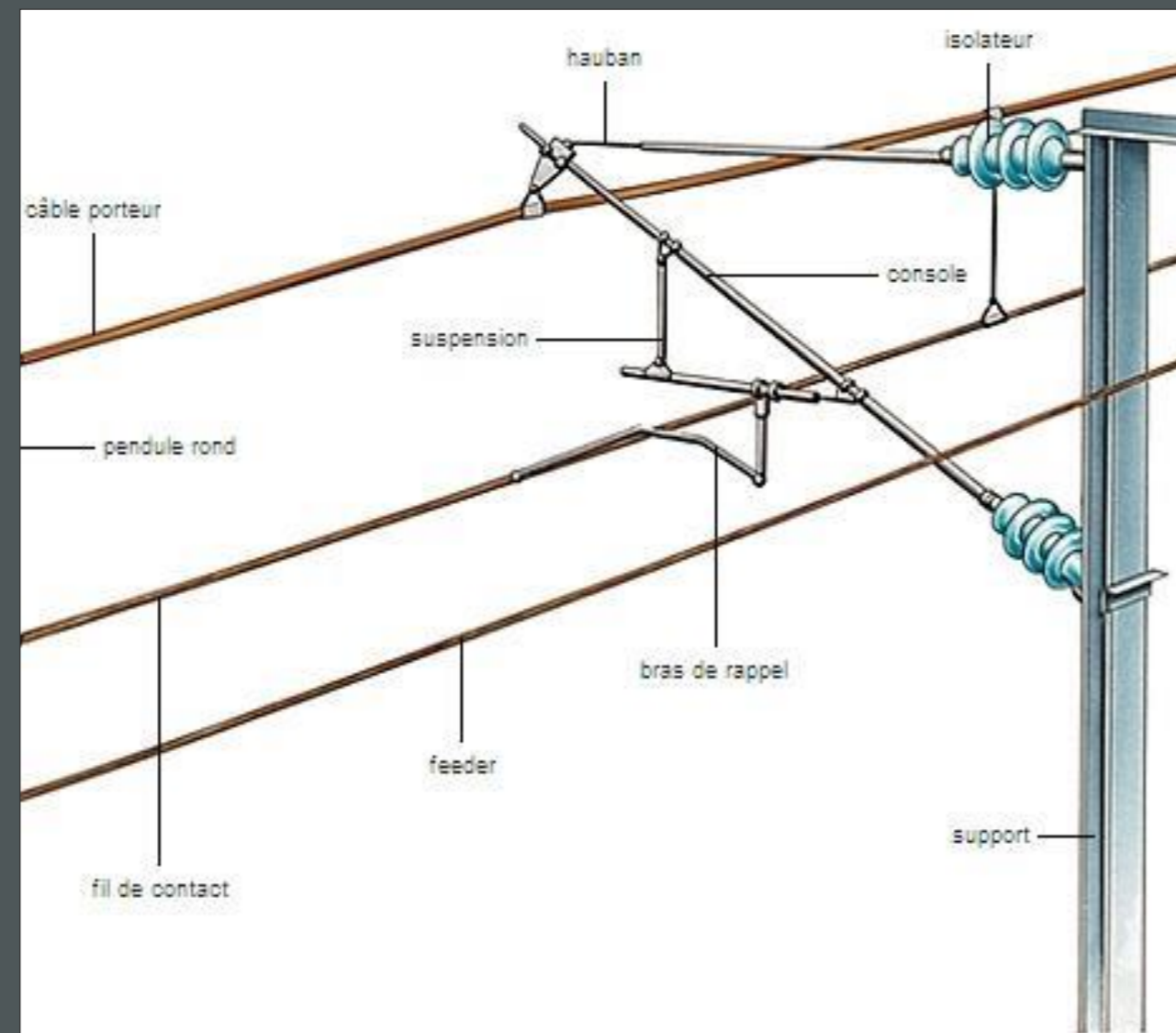
High output OCS Renewal trains

Birth of a project &
Inspiring implementation

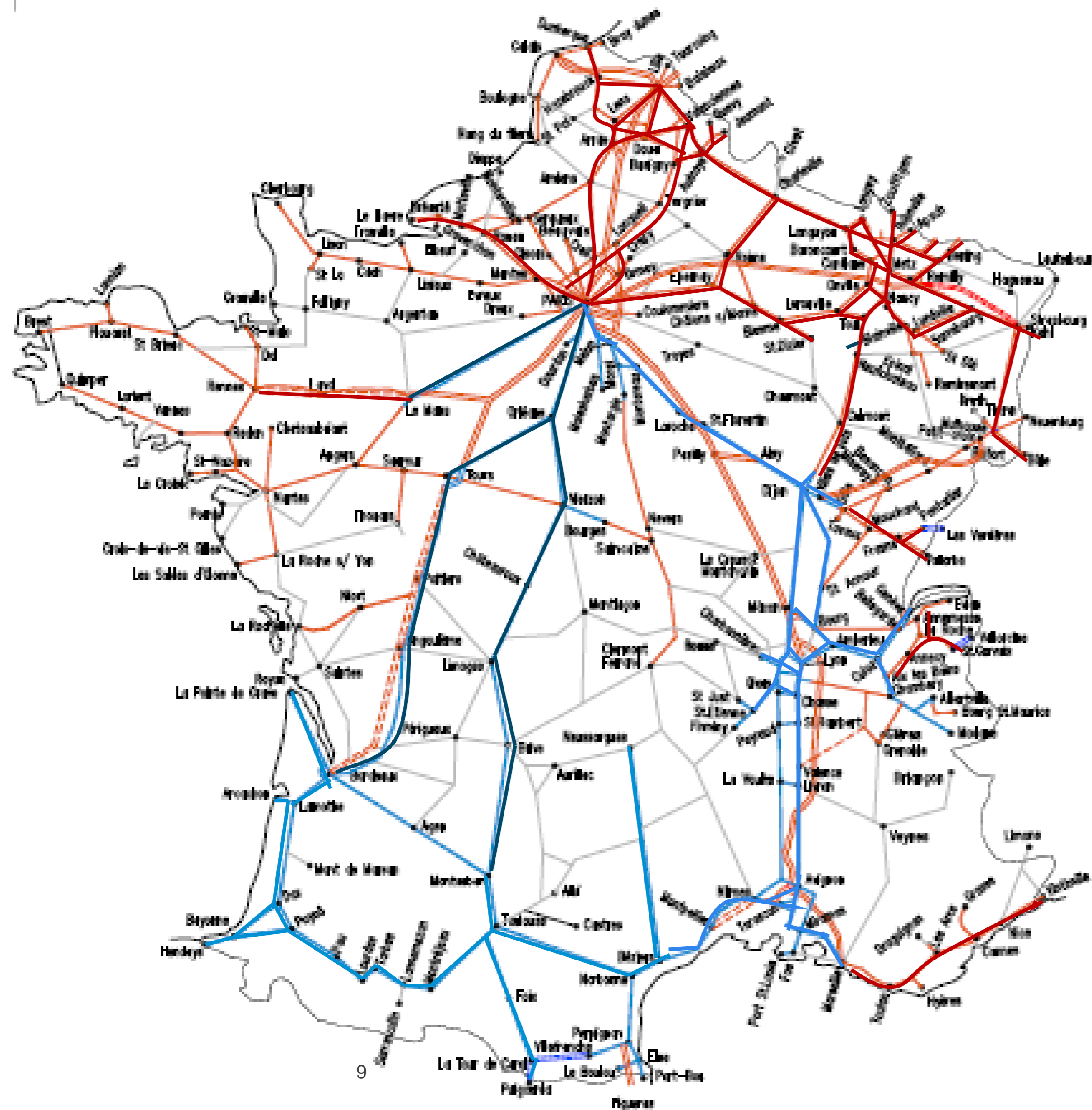
Agenda

1. **OCS assets and financial trajectory**
2. **Need for rethinking OCS renewal methods**
3. **A dedicated organisation to address the challenge**
4. **Structuring technical choices**
5. **A specific procurement strategy**
6. **Inspiring experience**

1. OCS assets and financial trajectory



OCS ASSET on French Network: AGING LINES



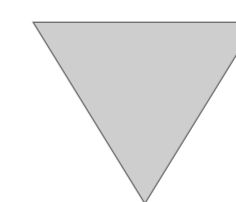
SNCF 25kV
 - 1950 – 1970
 3800 kms

SNCF SE 1,5kV
 1945 – 1970
 1600 kms

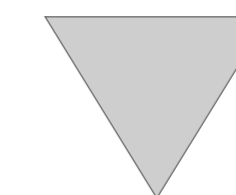
SNCF O-SO 1,5kV
 1921 – 1943
 1400 kms

Midi network 1,5kV
 1913 – 1935
 1500 kms

30 500 km of tracks



15 764 Km of electrified lines



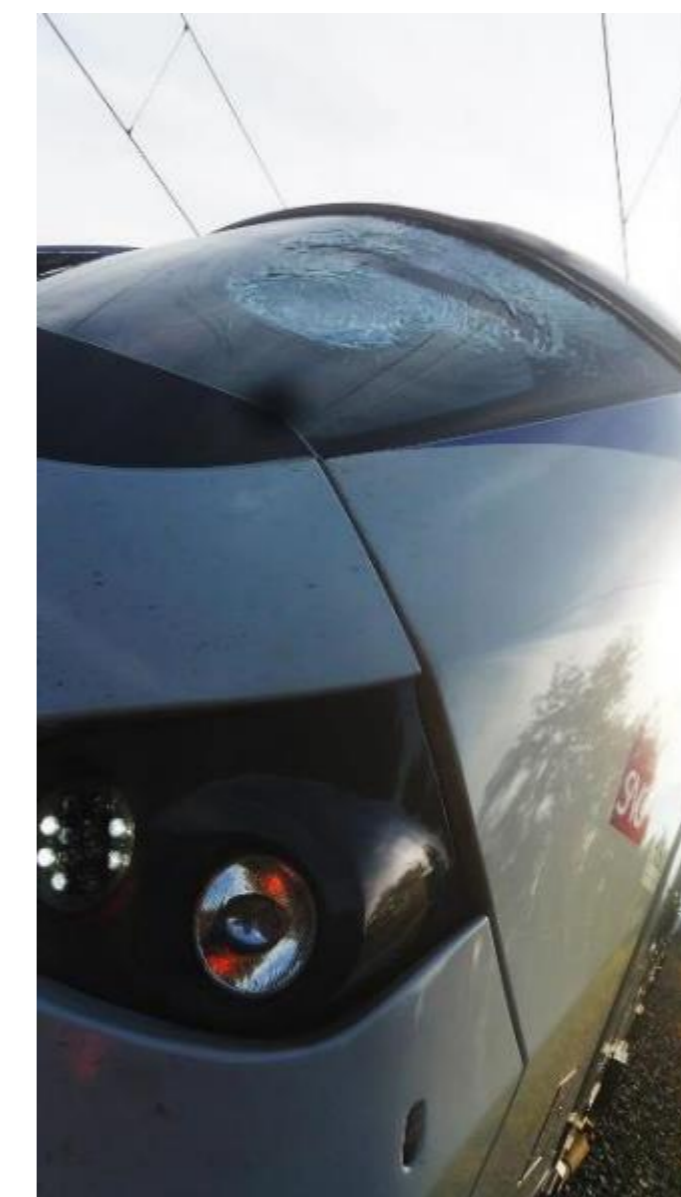
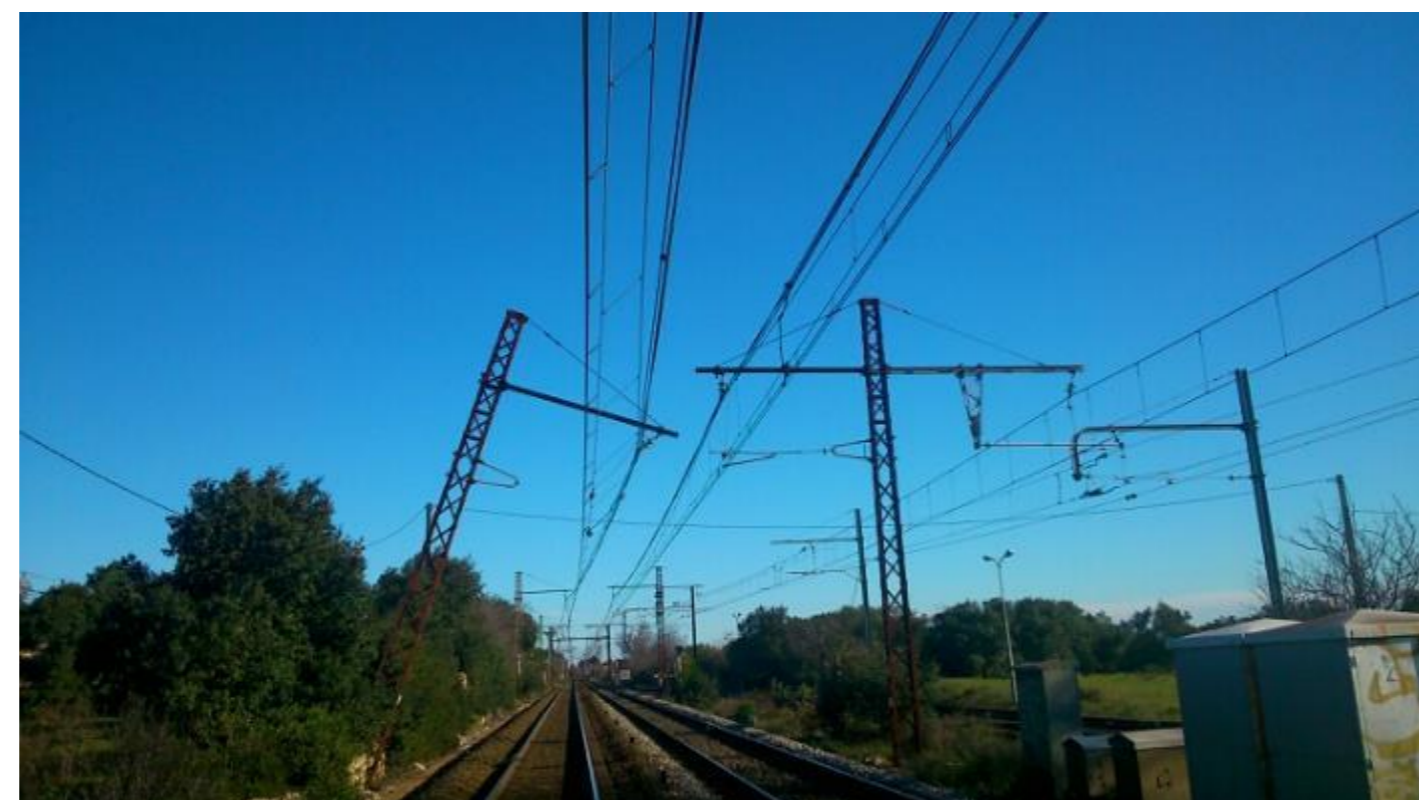
8 992 Km of 25 kV electrified lines
 5 812 Km of 1,5 kV electrified lines

Half of the electrified domain is older than 50 years

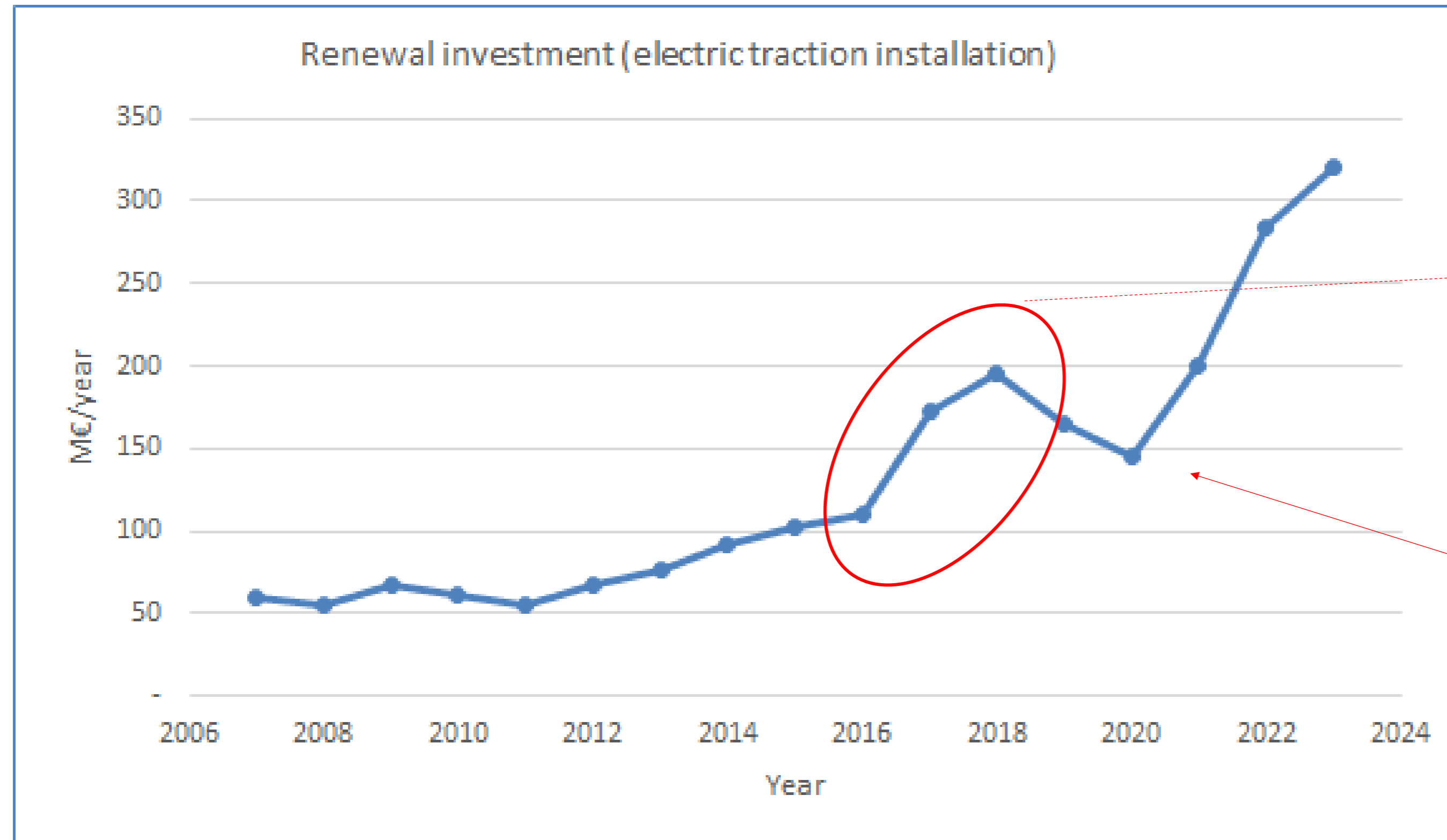
Safety events or threats

25 kV

1,5 kV



Financial context



OCS renewal operation forecasted

technical delays and COVID crisis

2. Need for rethinking OCS renewal methods

European benchmark

UK and AUSTRIA railway networks

- Network Rail
- OBB

Several topics analysed

- Bidding process
- Works organisation
- Cost and timescale of projects
- Optimisation options

Main lessons to be learned

- Regarding the main difficulties and limitation
- Regarding the overall performance (technical, financial)

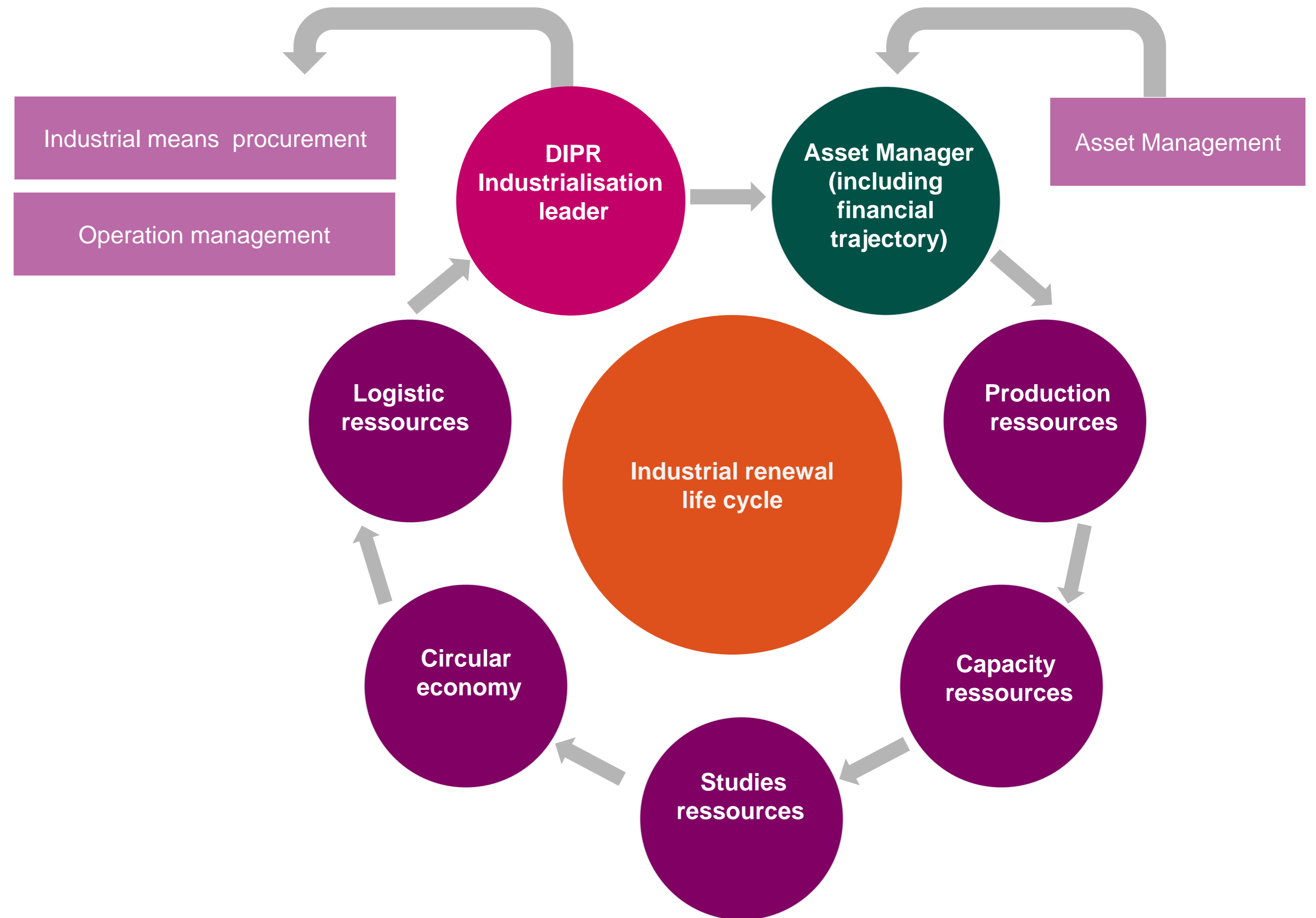
As a conclusion, it was stated that existing solutions could not fully answer to the specific needs and constraints of the French railway network

- ▶ Need to develop new high output OCS renewal solutions



Industrial renewal lifecycle

DIPR:
Direction of Industrial Renewal Projects



3. A dedicated organisation to address the challenge

Collaborative and innovative approach

► MULTIDISCIPLINARY TEAM

OCS design experts, works specialists, procurement specialists, asset managers, finance and legal specialists

► TECHNICAL DIALOGUE WITH INDUSTRY

Explanation of new SNCF Réseau expectations and objectives, reaction of industrial actors, first feasibility assessments, sharing of preliminary proposals

► IDENTIFICATION OF TOUGH ISSUES

2 types of OCS to be addressed (25 kV and 1,5 kV), capacity limitations for work execution, asset heterogeneity

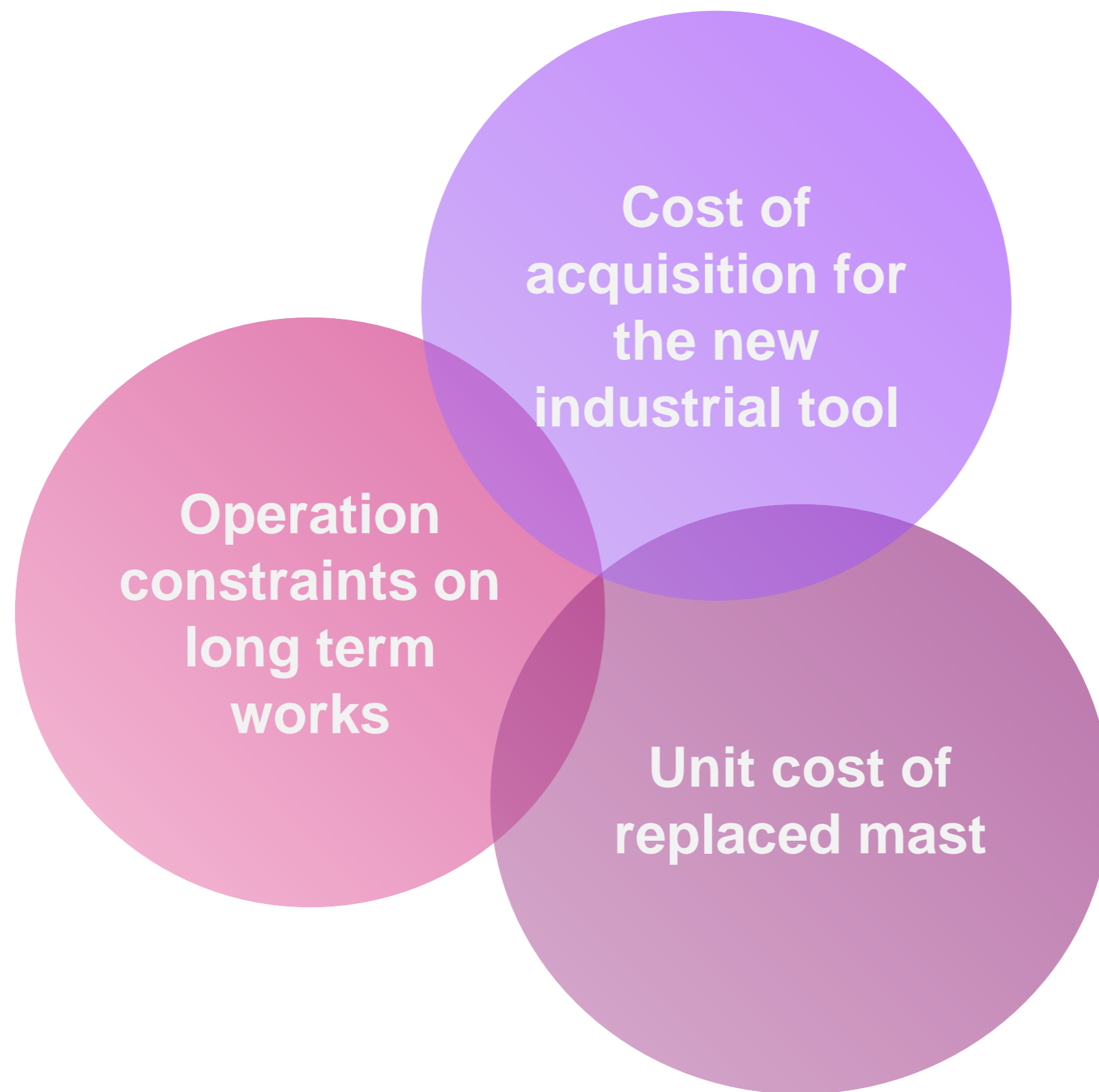
► MAJOR DRIVERS AND PRINCIPLES

Scope of operation (dense zones and Midi OCS not to be addressed), dedicated work trains, environmental performance, optimised safety

A full year of co-construction



Targeted trade-off



4. Structuring technical choices

Common options and requirements for 25 kV and 1,5 kV

► PRESERVED CONDUCTORS

Dedicated conductors replacement programs were already in place and successful

► UNCHANGED PERFORMANCES FOR THE RENEWED OCS

STI is conserved for already certified lines, no new STI certification was considered to be reached through renewal works

► MINIMUM WORK SLOTS OF 4H

Slots are guaranteed by SNCF Réseau, commitment to target extended slots up to 5h30 when possible

► NOMINAL SPEED LINE AT WORK RESTITUTION

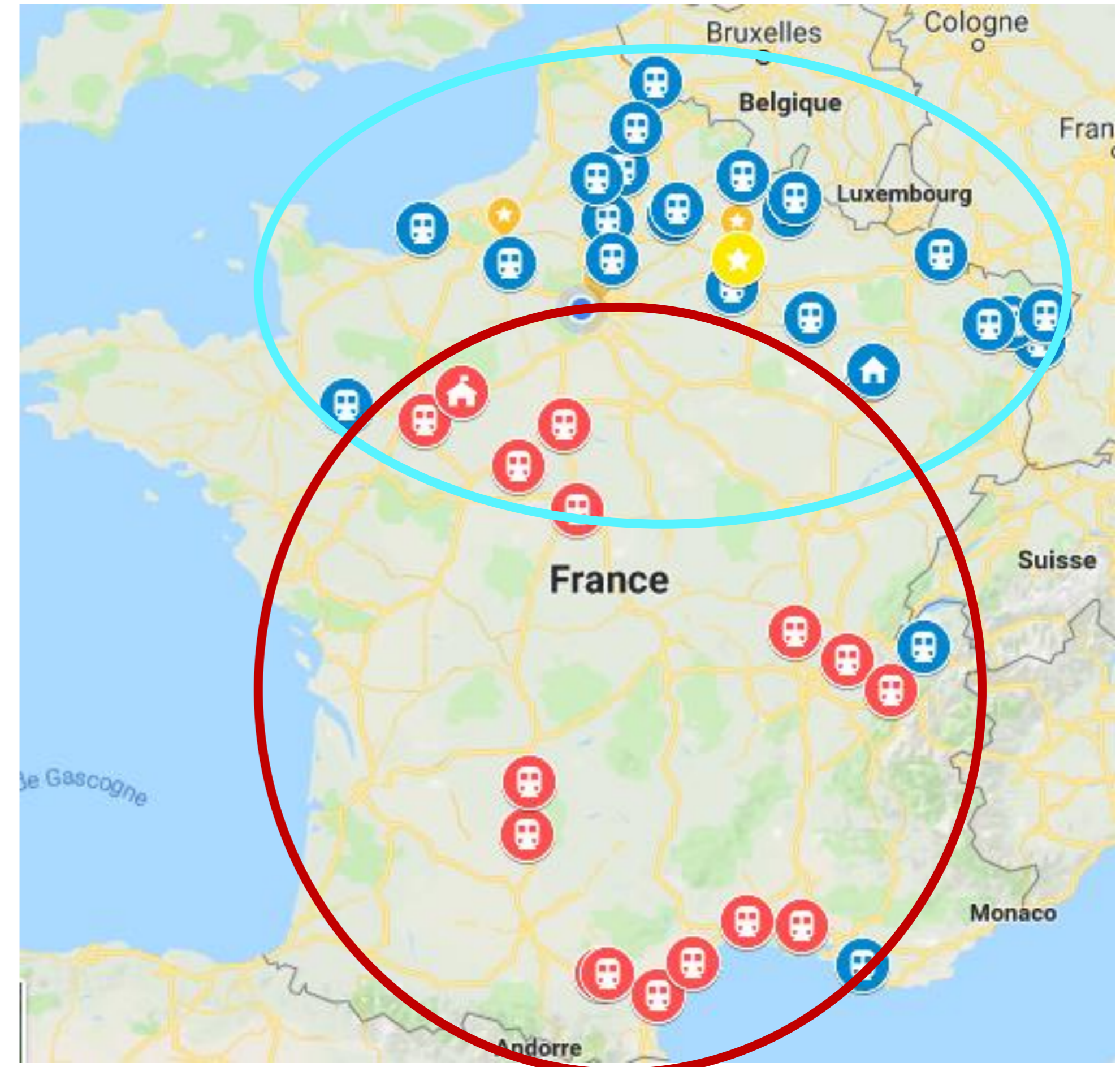
No additional OCS fine tuning to be done after renewal operation

► WORKS CONCOMITANCE

1,5 kV and 25 kV operations to be executed simultaneously on different yards

► MINIMISED CAPACITY IMPACT

Works with energised adjacent track to be targeted



Work yards of the first 3 years (1,5 kV and 25 kV)

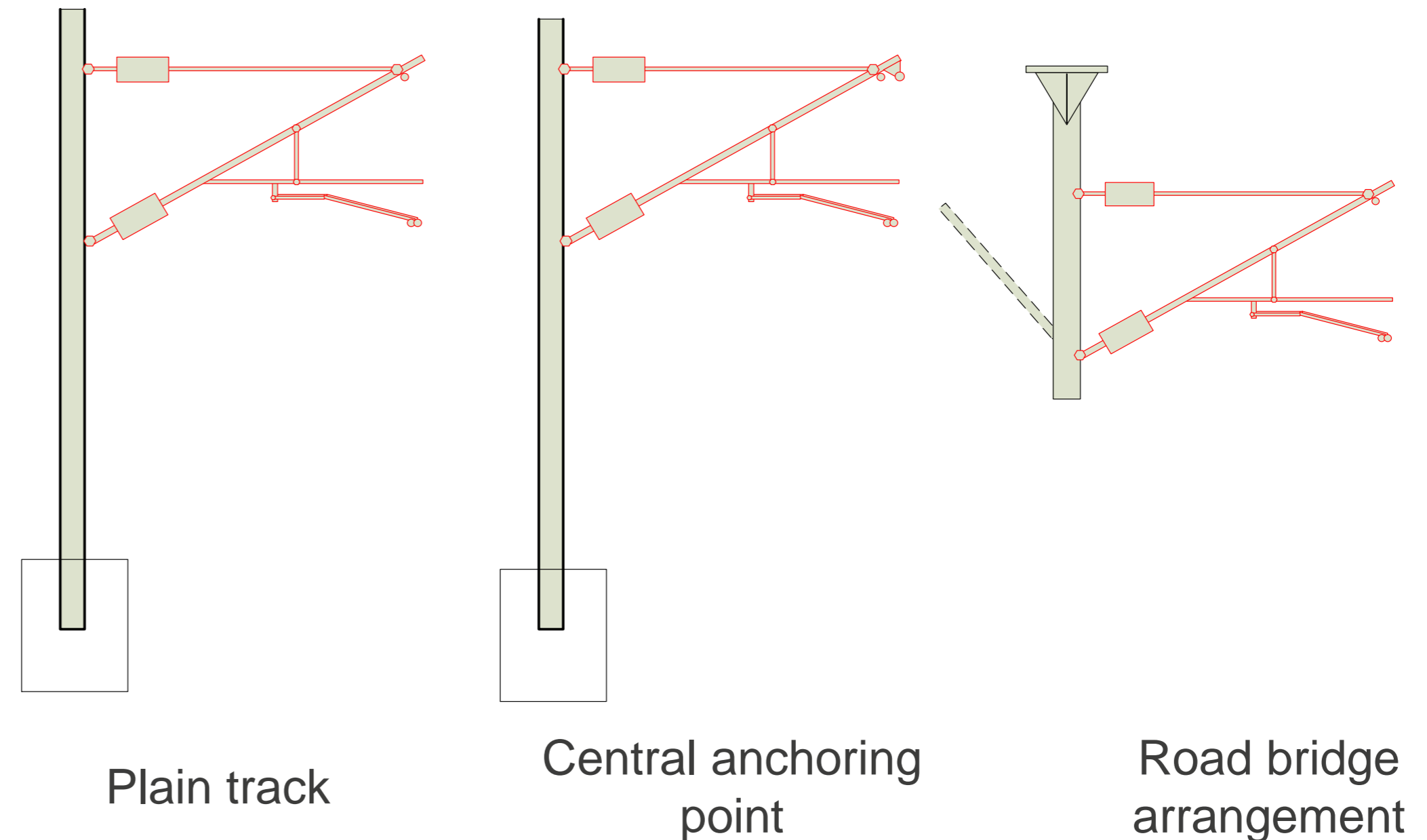
25 kV specific technical choices and requirements

► PARTIAL REPLACEMENT

Only cantilever is renewed (lifetime shorter than mast)

► DROPPING RENEWAL

Droppers are replaced within the same work slot



1,5 kV specific technical choices and requirements

► COMPLETE REPLACEMENT

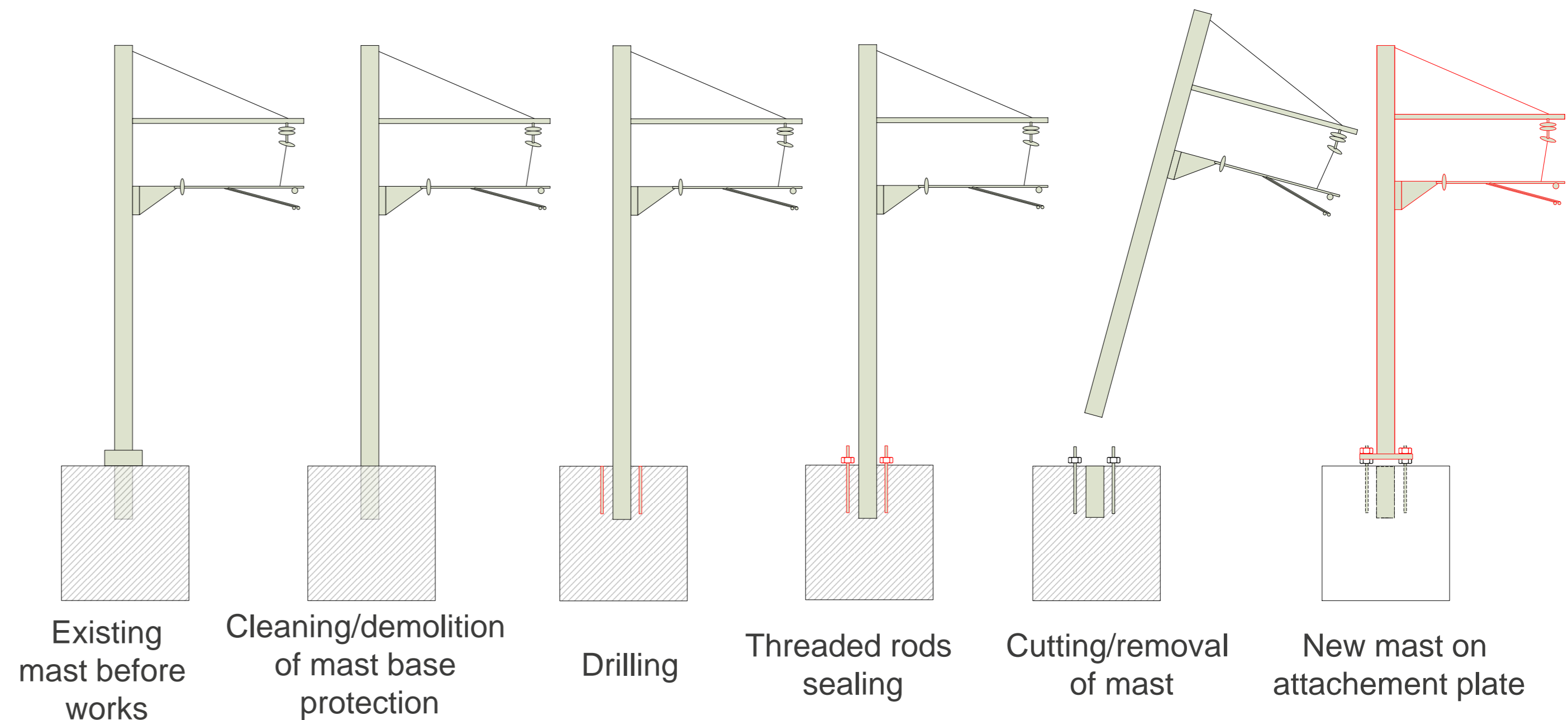
Cantilever and mast are completely renewed

► ISO PEGGING OUT OPTION

Extra civil works and complex additional OCS studies are minimized by preserving the existing configuration for mast implementation

► MAXIMIZED FOUNDATION REUSE

Geotechnic calculation together with risk analysis are used to validate the reuse of existing foundations



5. A specific procurement strategy

Design to cost approach & investments securing

▶ GUARANTEED TURNOVER OVER THE TERM OF CONTRACT

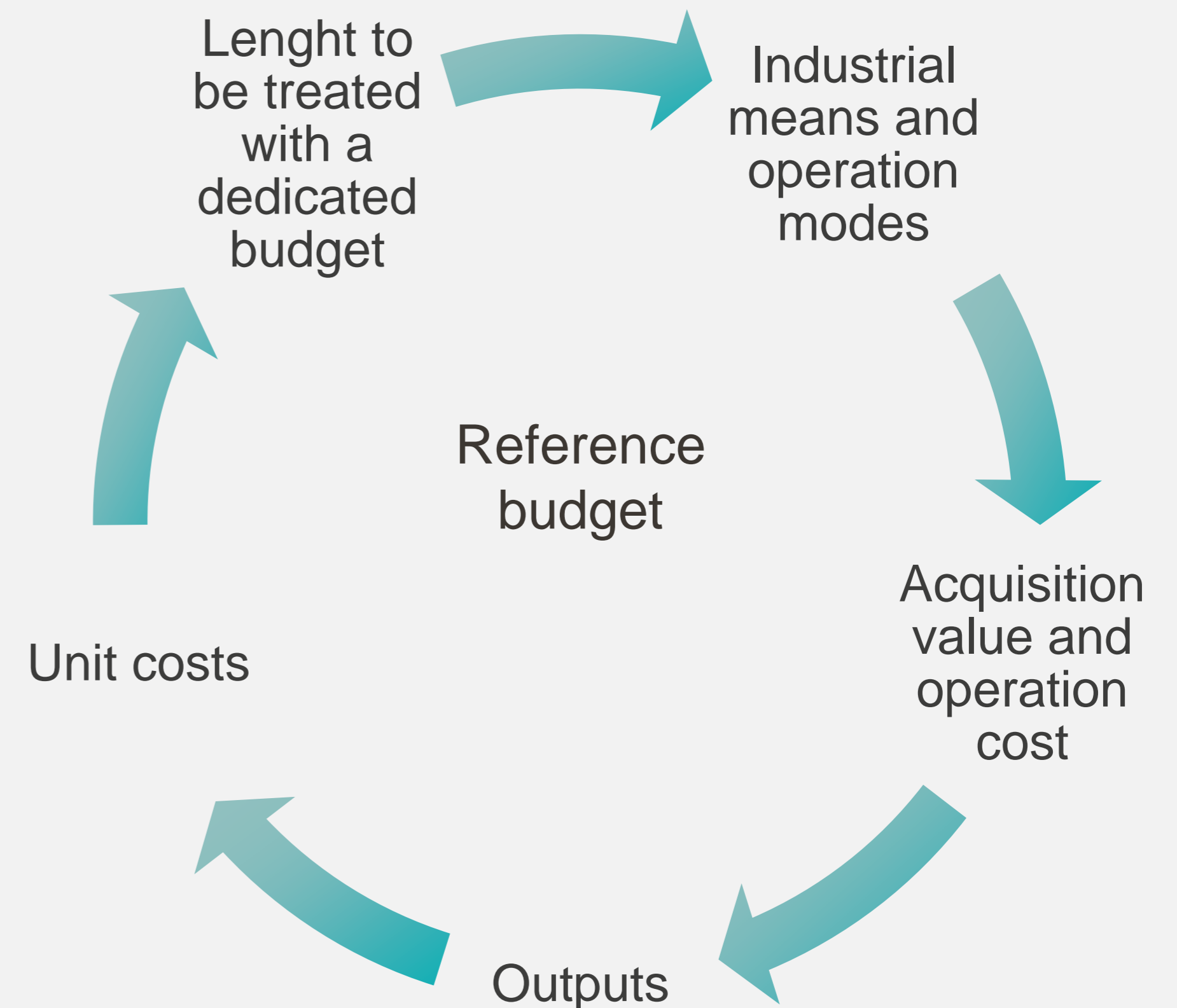
Bidders free to build technical proposals compliant with functional requirements
Offers were assessed with regard to global output

▶ GUARANTEED WORKS PERIOD

5 years of works with possible extension to 7 years
Visibility and anticipation for industrial investments

▶ ADVANCE FUNDING FOR PREPARATION WORKS

Expenses for 2 years of design and fabrication of the industrial tools were covered by SNCF Réseau



Main goal

Reduction of unit cost



Optimised cost
for each renewed kilometer

Increase of renewal speed



Reduction
of capacity footprint



Cheaper



Faster

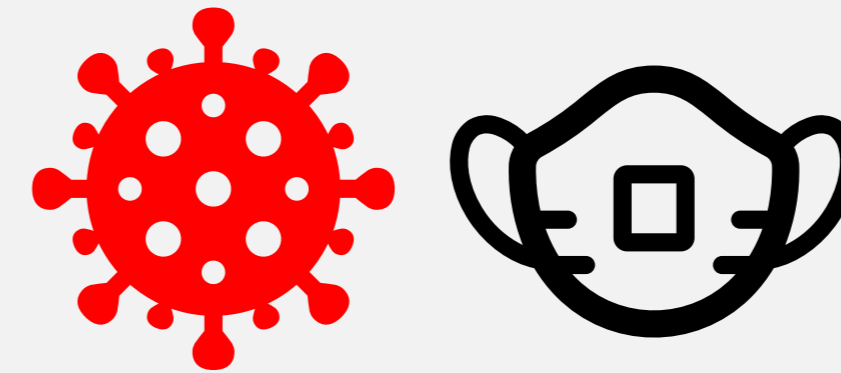


Larger (scale)

Management of hazards and disturbances

► COVID CRISIS

Just after the very start of OCS renewal trains, a major difficulty in the industrial process



► TECHNICAL ISSUES

New chemical sealing to be introduced when hydraulic sealing are not feasible
Additional studies and validation steps



**PROBLEMS WERE SOLVED WITH AGREED ADDITIONAL INVESTMENTS
AND ADJUSTMENT OF THE CONTRACT PERIOD**

ROBUSTNESS OF THE SHARED PROCUREMENT POLICY WAS KEY TO SUCCEED

6. Inspiring experience

Procurement and field return

**Procurement policy
implementation and continuous
improvement**

**Benefiting from previous experience
of tracks industrial renewal**

**Inspiration for continuous improvement
actions to be implemented between
studies/works/industrial process**

Having a look about performance



Length:
200 to 250 km / years
Cost / armament:
6800€

25KV Train



Length:
100 to 150 km / years
Cost / Pole & armament:
40.000 €

1,5KV Train



Average yields observed:
Single pool: 20 mn
Intermediate pool: 30 mn
Anchor Pool: 45 mn
Top record:
25kV: 37 armaments in one daily slot
1,5 KV: 18 poles in one daily slot

Yield and top performance



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Thank you for your attention

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11:45 AM - 12:30 PM:
The Client's Perspective:
Why It Works

Industrial Results

Agenda

1. Methodology
2. Key Results & Analysis
3. Recommendations
4. Work in Centre Val de Loire: Spring 2024
5. Work in Bourgogne Franche-Comté: Summer 2024

1. Methodology

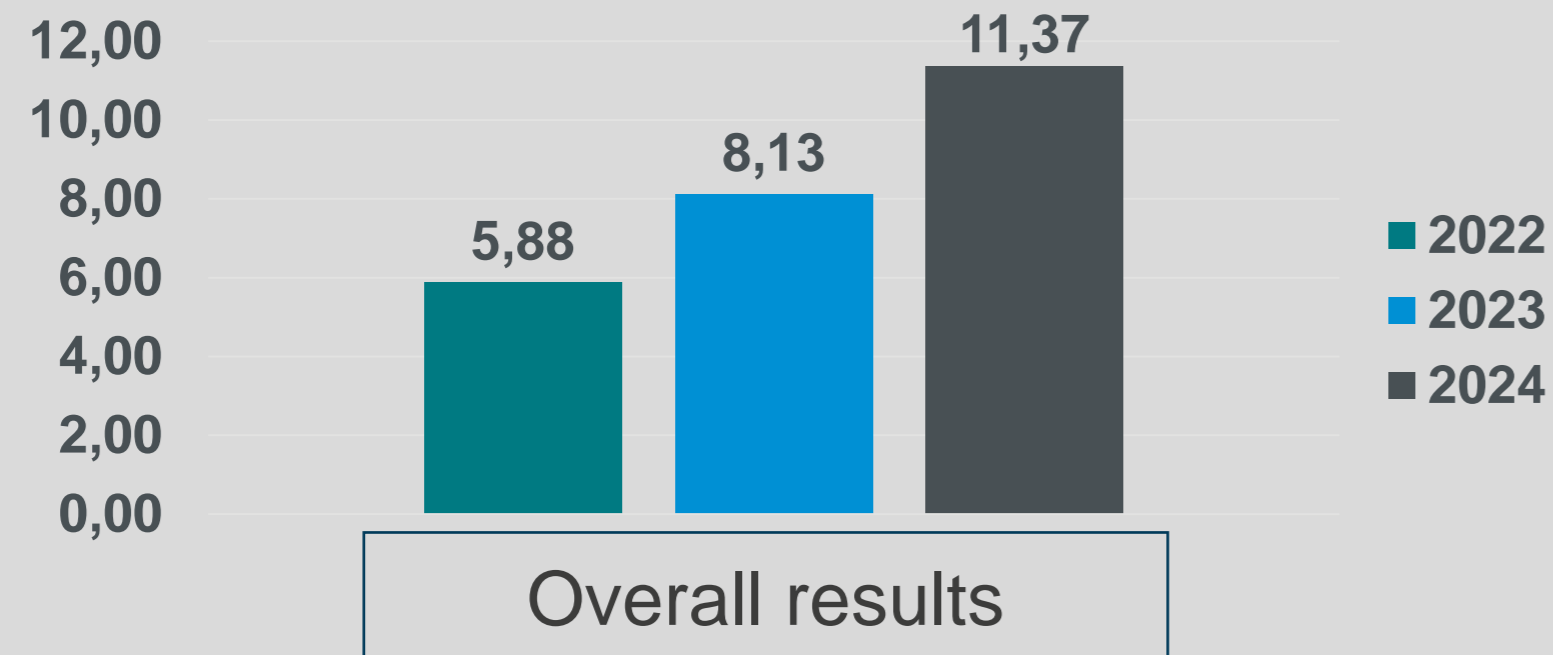
Industrial Results

Methodology

1,5 kV

- Comparing the average number of cantilevers and masts renewed during a work session ;
- Corresponding conditions ;
- Each region ;
- From one year to another ;

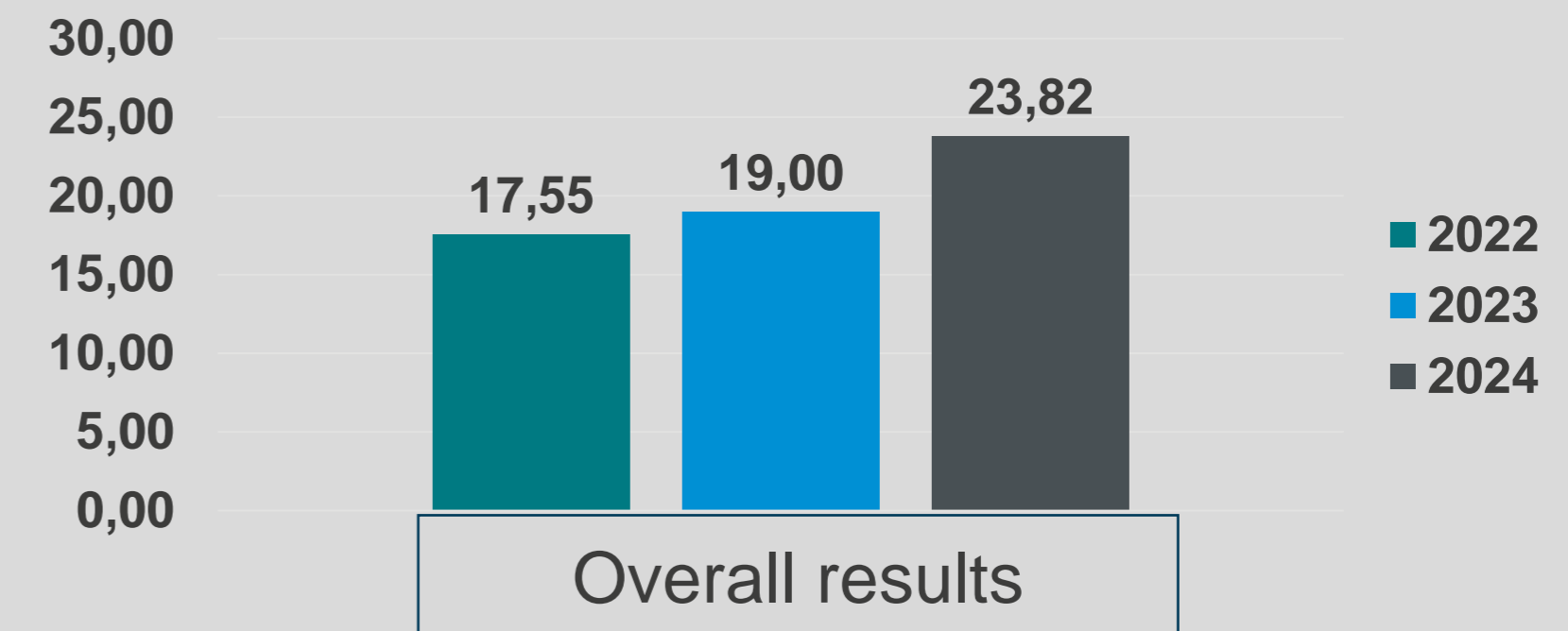
+ 93 % from 2022 to 2024



25 kV

- Comparing the average number of cantilevers renewed during a work session ;
- Corresponding conditions ;
- Each region ;
- From one year to another

+ 35 % from 2022 to 2024

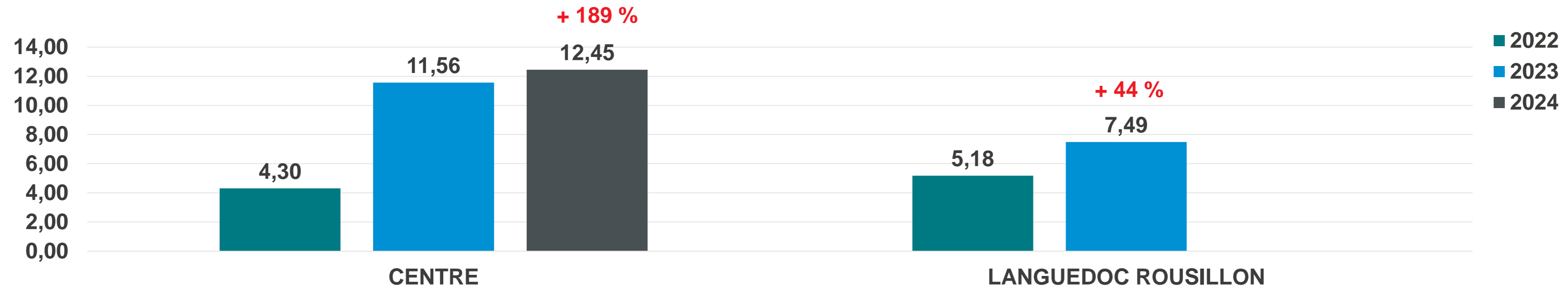


2. Key Results & Analysis

Industrial Results

Key Results & Analysis

1,5kV cantilevers and masts replaced in a work session



KEY FACTORS

- Work duration
- Continuity in the production (no break in the renewing of masts)
- Carrying capacity (number of new masts on the train)
- Mast surrounding (access)
- Wind and temperature
- Geometry of the railway line

Industrial Results

Key Results & Analysis

**1,5kV
cantilevers and masts**

	Max	Min
Single mast	00:30:00	00:14:37
Intermediate mast	00:55:00	00:31:01
Anchor mast	01:47:00	01:11:03

Year after year, average times decrease from one railway line to another.
Methodologies are improving.
(Hydraulic sealing has been replaced by chemical sealing)



Single mast

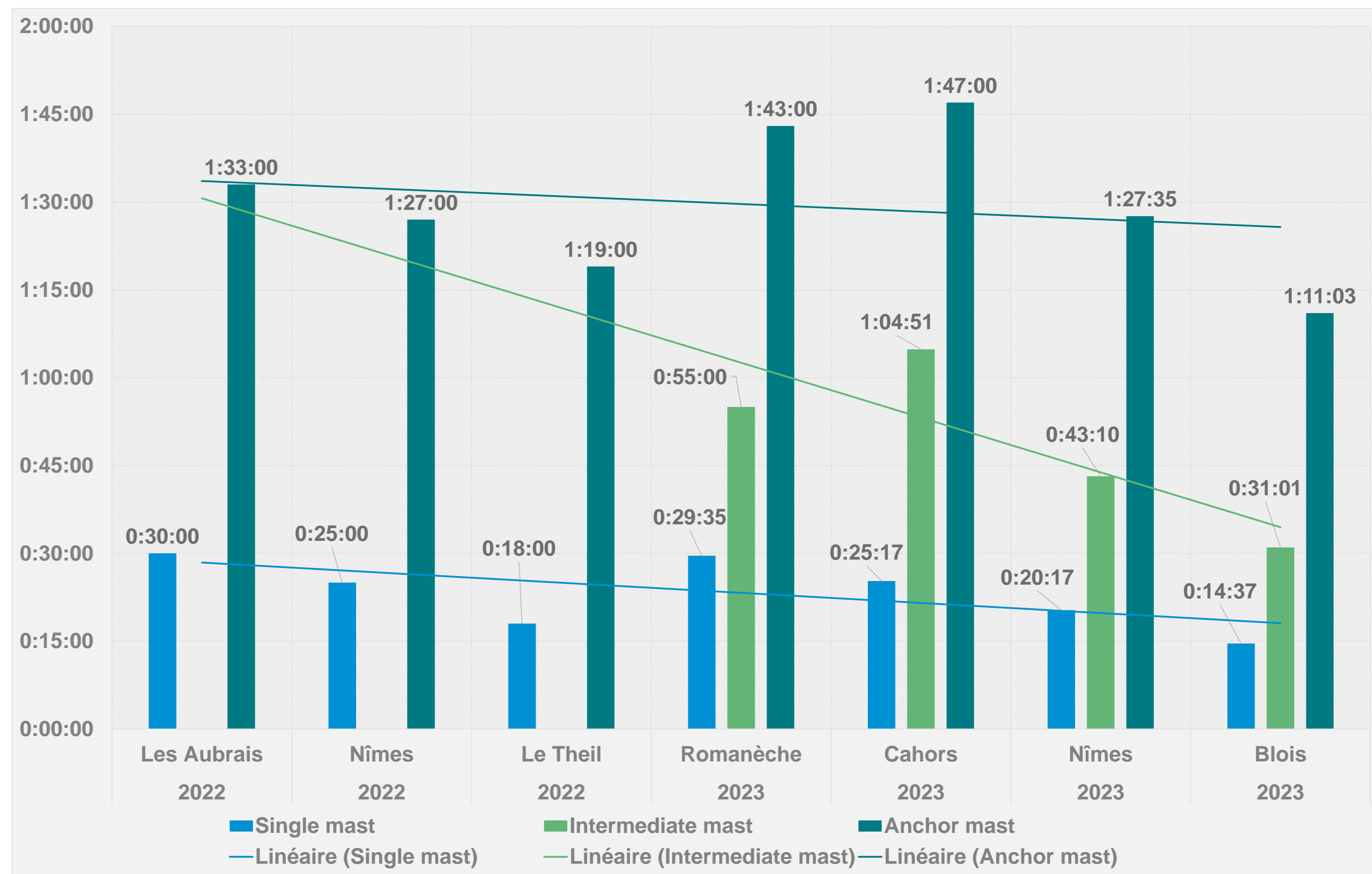


Intermediate mast



Anchor mast

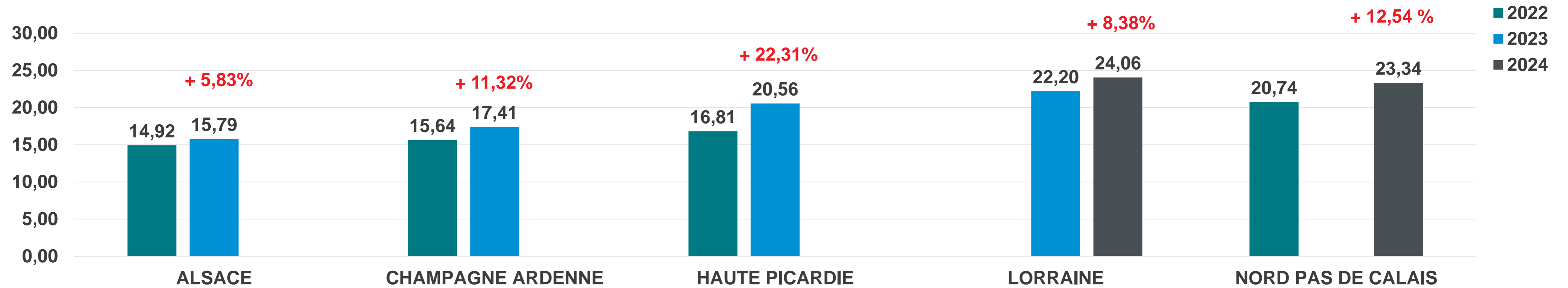
Evolution of average time



Industrial Results

Key Results & Analysis

25 kV
Cantilevers replaced in a work session



KEY FACTORS

- Work duration
- Geometry of the railway line
- Wind and temperature
- Human factors
- Mast surrounding (access)

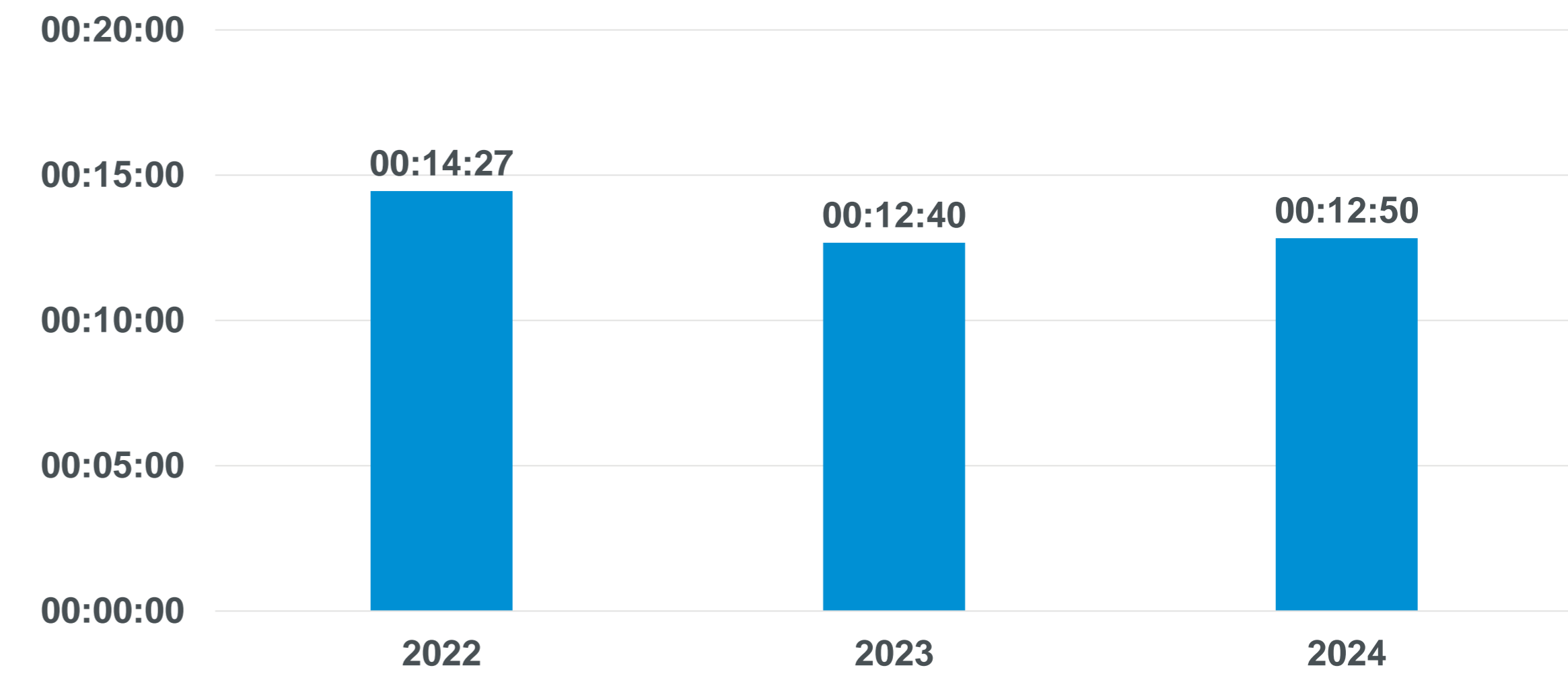
Industrial Results

Key Results & Analysis

**25 kV
Cantilevers**

From 2022 to 2024, the weighted average time decrease about 12%.

Weighted Average Time



Year	Chantier	Cantilevers replaced	Average number of cantilevers replaced during a period	Work duration	average time
2022	Blacy	560	14,7	05:30	00:17:36
2022	Saverne	569	14,6	05:48	00:16:35
2022	Armentieres	787	20,7	05:29	00:14:42
2022	Longueau	622	16,4	04:54	00:13:00
2022	Marseille	829	19,3	05:47	00:11:44
2023	Saverne	757	15,8	04:41	00:14:16
2023	Chalons	851	16,7	05:14	00:13:05
2023	Toul	1088	22,2	06:24	00:12:36
2023	Albert	986	19,3	06:01	00:11:11
2024	Thionville	633	24,3	06:53	00:13:25
2024	Neufchâteau	1301	24,1	06:07	00:12:33

Industrial Results

Key Results & Analysis

25 kV
cantilevers

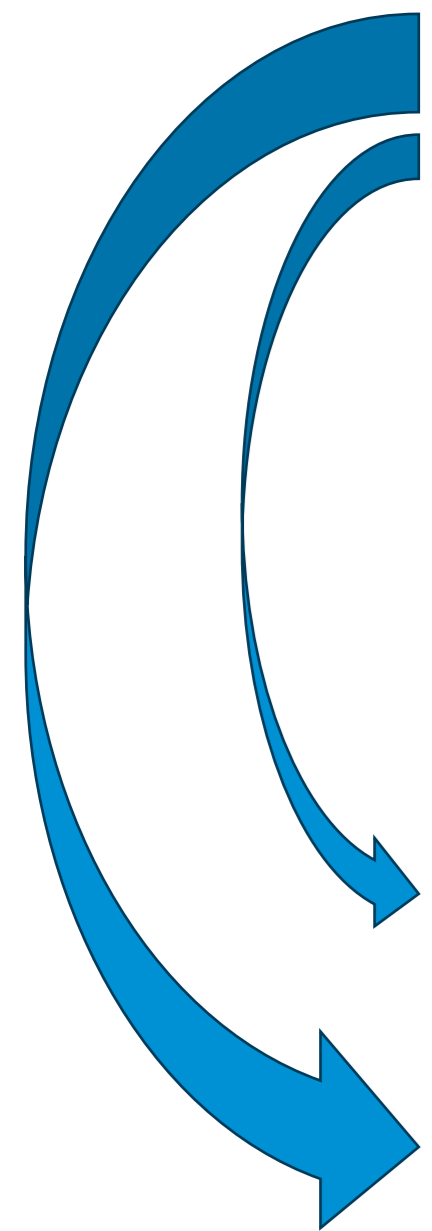
A cantilever can now be renewed in 10 min vs 60 min



3. Recommendations

Industrial Results

Recommendations



WORK DURATION IMPACT THE EFFICIENCY			
Efficiency	Work duration between 4h and 5h	Work duration between 5h and 5h30	Work duration between 5h30 and 6h00
25 KV	18 cantilevers	22 cantilevers	25 cantilevers
1500 V	10 masts & cantilevers	12 masts & cantilevers	13 masts & cantilevers

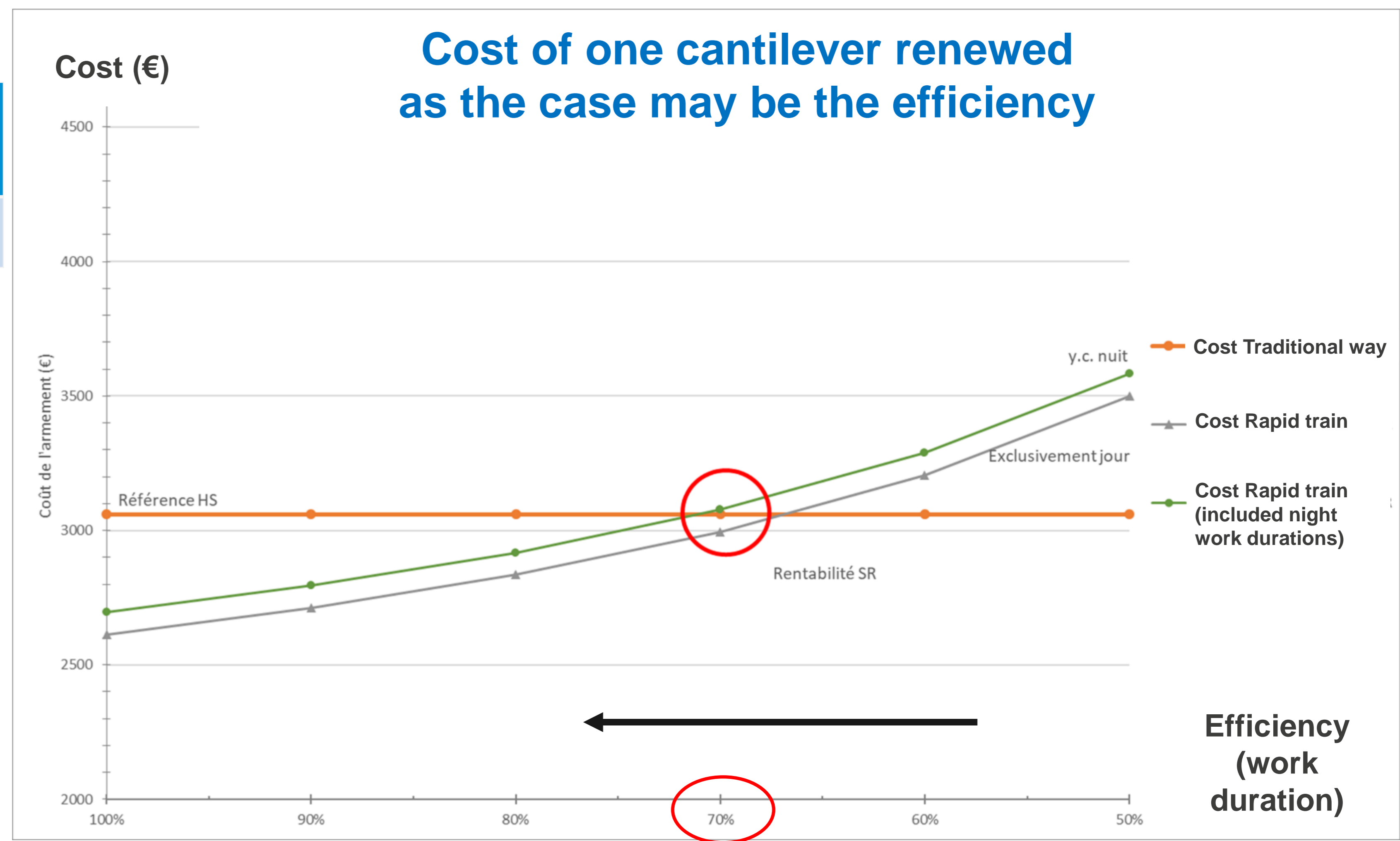
Industrial Results

Recommendations

Efficiency	Work duration between 5h and 5h30
25 KV	22 cantilevers

70% of 22 cantilevers
=> 15,4 (16 cantilevers)

Beyond the efficiency of 16 cantilevers renewed in a work duration, the cost of one cantilever renewed is less expensive with the rapid train.



Industrial Results

Recommendations

**1,5kV
cantilevers and masts**

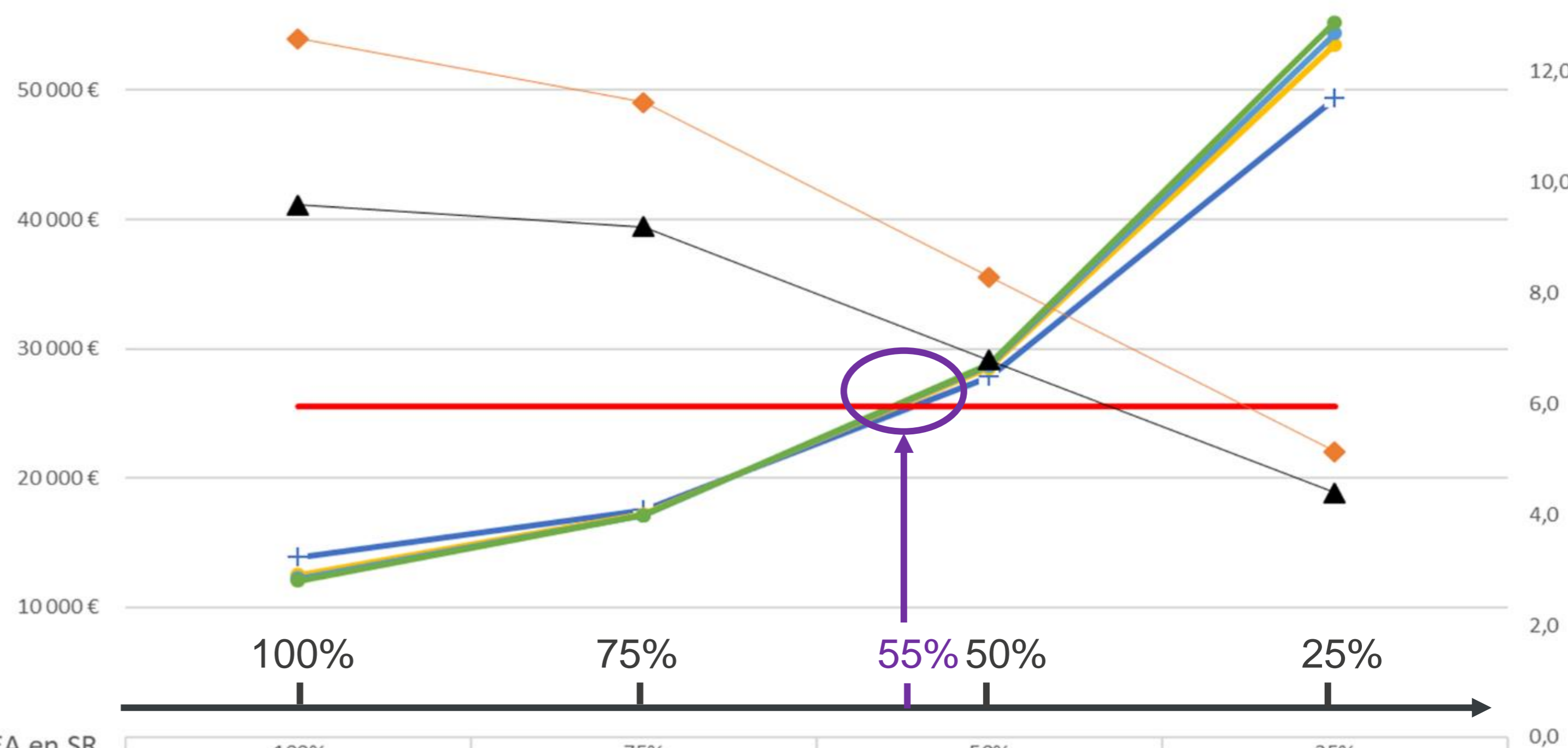
The more you use the rapid train, the lower the cost of one cantilever & mast renewed is.

Beyond a share of 55%, the average annual cost of one cantilever & mast renewed is less expensive than with only a traditional method.

EFFICIENCY
(work duration 5h30)

- ▶ **Traditionnal method:**
from 1 to 2 cantilevers & masts
- ▶ **Rapid Train:**
from 7 to 12 cantilevers & masts

Cost of one cantiliver & mast renewed as the case may be the share of the rapid train activity in the annual renewal plan



Taux de REA en SR	100%	75%	50%	25%
4h00	13 886 €	17 536 €	27 847 €	49 405 €
5h00	12 514 €	17 210 €	28 558 €	53 522 €
5h21	12 252 €	17 144 €	28 703 €	54 401 €
5h30	12 054 €	17 117 €	28 869 €	55 255 €
Cout du HS	25 563 €	25 563 €	25 563 €	25 563 €
Rendement quotidien 5h21	12,6	11,5	8,3	5,2
Rendement quotidien 4h	9,6	9,2	6,8	4,4

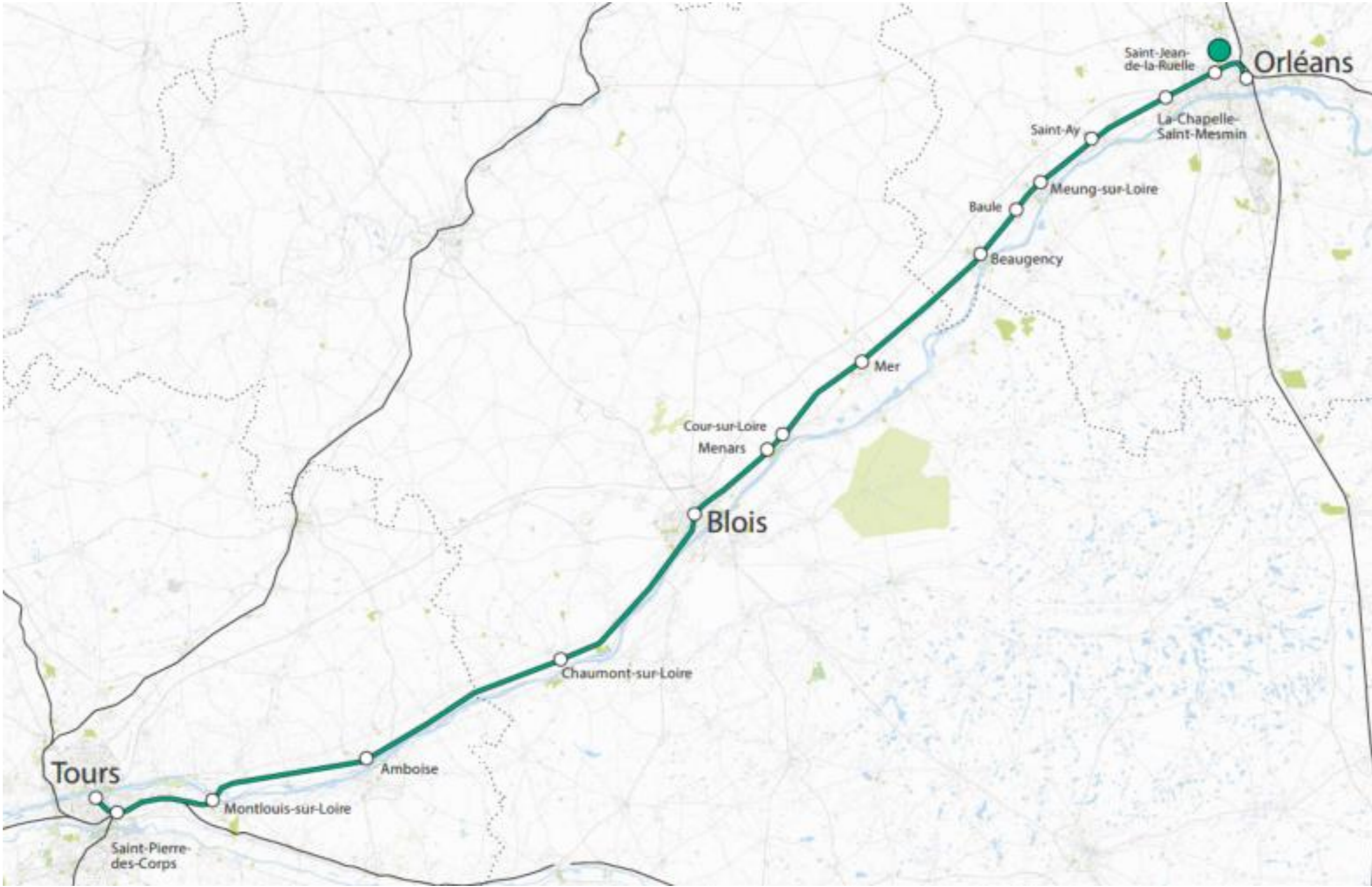
4. Work in Centre Val de Loire: Spring 2024

Speed

Reliability

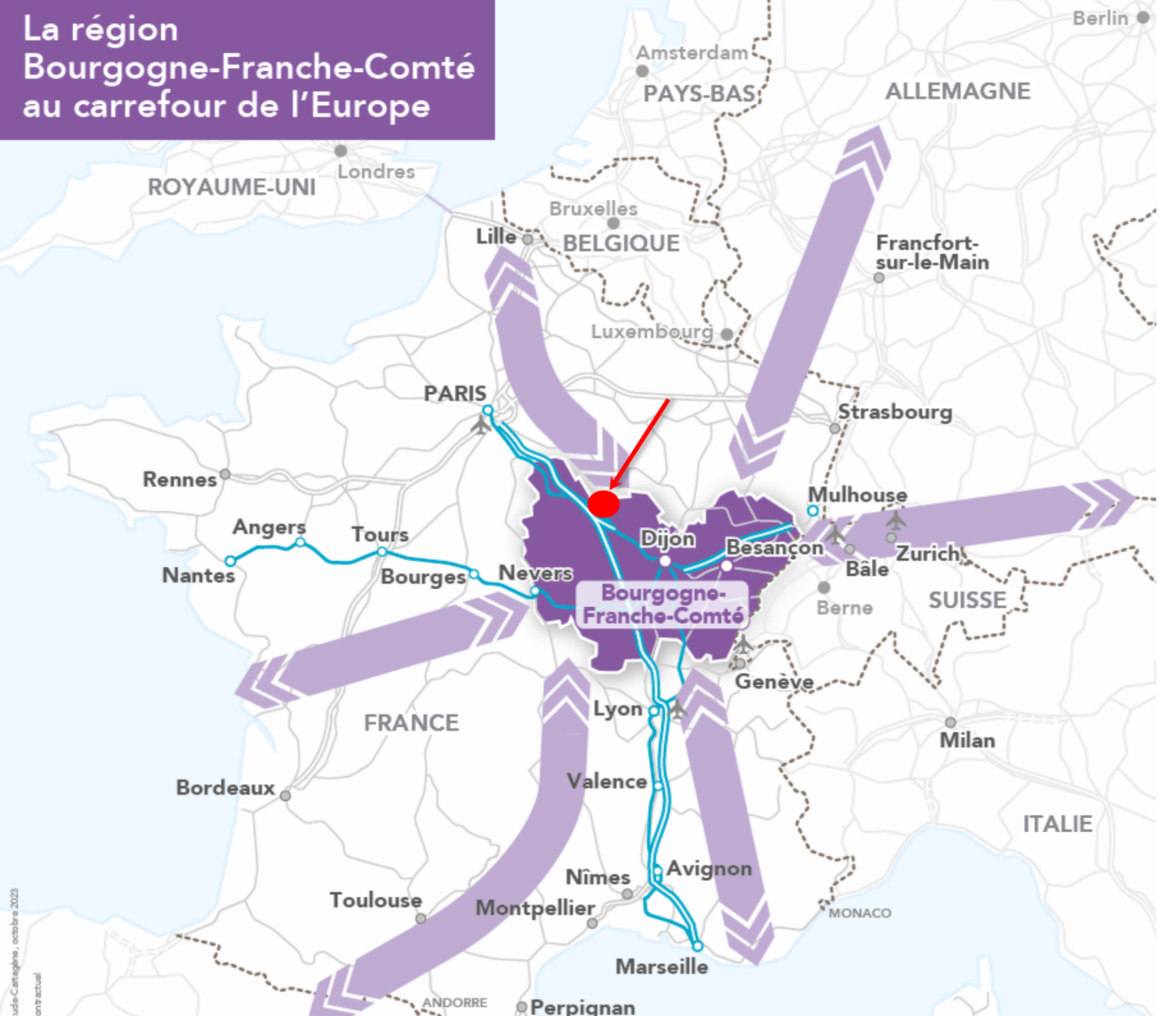
Local anchoring and communication

Pride



5. Work in Bourgogne Franche-Comté: Summer 2024

La région
Bourgogne-Franche-Comté
au carrefour de l'Europe



Security
Reliability
Low noise



Custom made
Agility
Attractiveness





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