INTERNATIONAL UNION
OF RAILWAYS

RESILIENT RAILWAYS
UIC STRATEGY

Resilience against natural hazards: How UIC is tackling resilience in railways thanks to the RERA projects

Francisco CABRERA

Deputy Head of Operations and Safety

November 2024

UIC Resilience approach

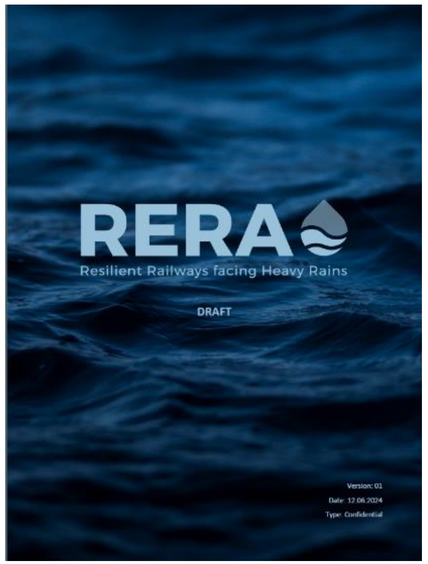
1. What we did do
2. What is on today
3. What are we going to do
4. How we are going to do
5. International coordination

1. What did we do

RERA
Resilient Railways facing Climate Change

RERA
Resilient Railways facing Heavy Rains

RERA
Resilient Railways facing High Temperatures



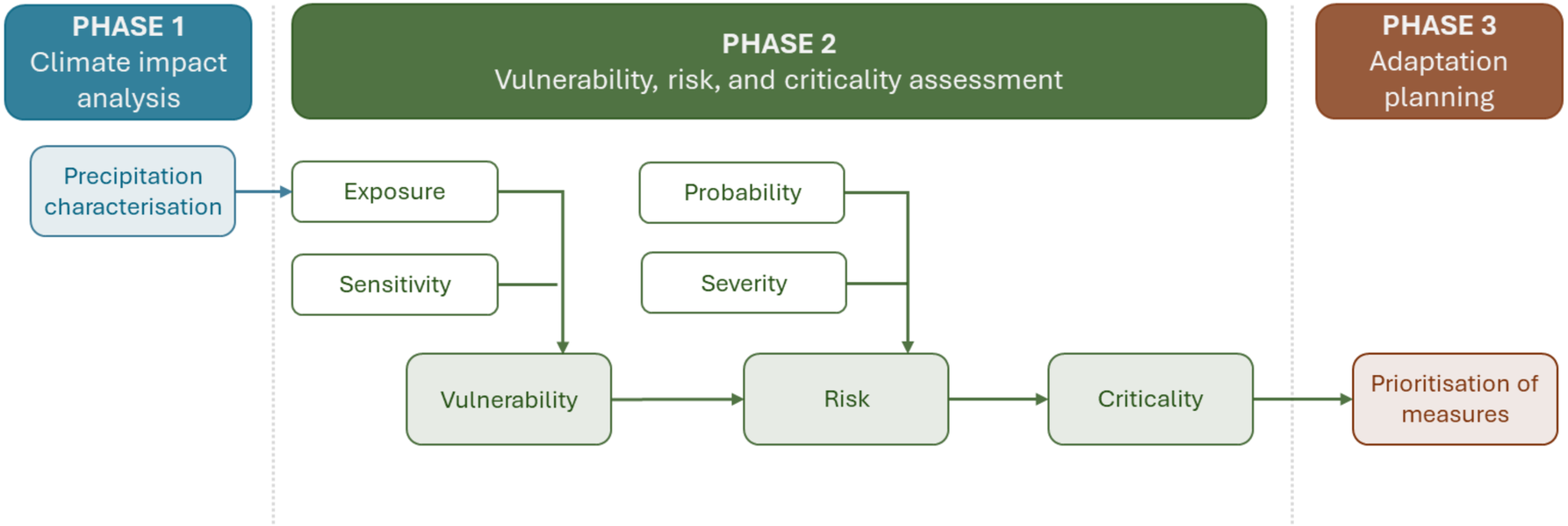
#	Topic	Description	Lead Expert(s)
1	**Track buckling**	Impact of high temperatures on tracks; design considerations; technological solutions, etc.	Rosa Casquero
2	**Human factors**	Including safety of passengers and workers, passenger comfort, working conditions, etc.	Carole Escolan-zeno
3	**Sand contamination**	Including sand impact on tracks, wheels, ballast contamination, humidity, etc.	Andreas Chantzaras
4	**Vegetation management**	Including fire risk management.	Katrin Neuhaus
5	**Rolling stock**	Impact of high temperatures on rolling stock: mitigation measures	Philippe Clement
6	**Assets affection**	Including signalling systems, electrification systems, and others	Andreas Chantzaras
7	**Climate data and projections**	Including: climate databases, climate indicators, projections, thresholds, tools, etc.	Pablo Vallhonrat Concepción Toribio
8	**Vulnerability assessment**	How to determine the level of vulnerabilty of railways assets	Pablo Vallhonrat Concepción Toribio Francisco Cabrera

1. What did we do: RERA Rain

Objectives: The document focuses on enhancing the resilience of railway systems against the impacts of heavy rainfall events, exacerbated by climate change. Its key goals include:

1. Providing infrastructure managers with strategies to adapt to changing precipitation patterns.
2. Ensuring railway networks remain safe, functional, and reliable in the face of extreme weather.
3. Guiding the integration of climate data into planning, maintenance, and management practices.

Proposed methodology:



1. What did we do: RERA Rain

RERA
Resilient Railways facing Heavy Rains

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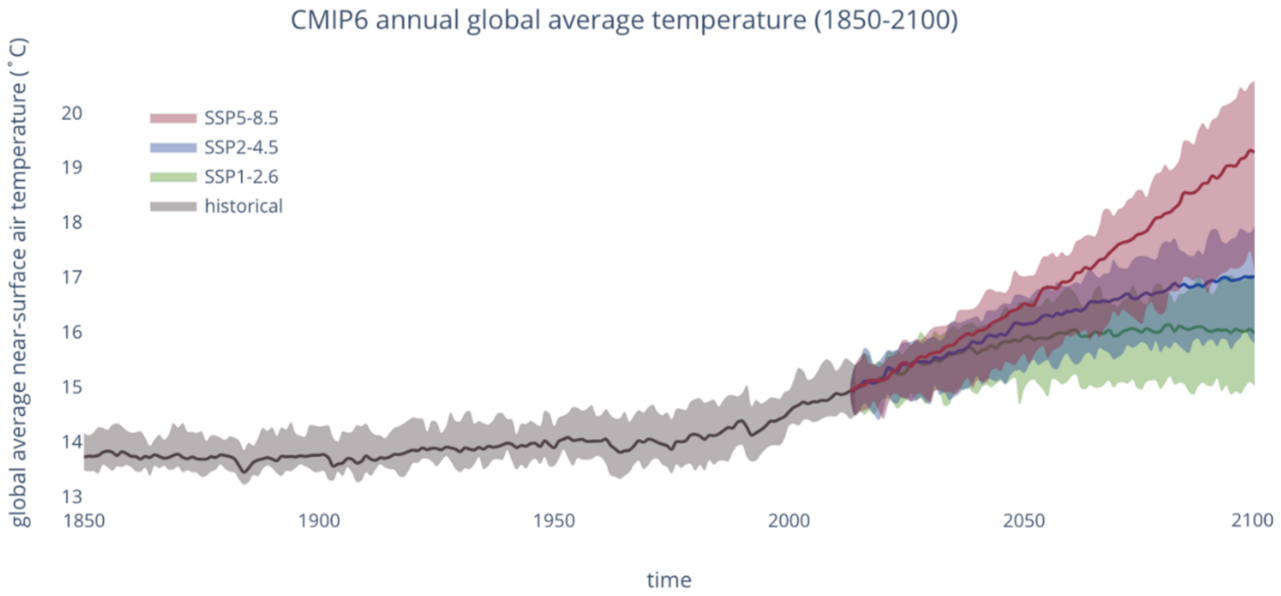

	T (Return period)									
	2	5	10	25	50	75	100	150	300	500
Observed	46	61	70	83	92	97	101	106	116	122

Routine event — Design event — Extreme event

		T (Return period)									
		2	5	10	25	50	75	100	150	300	500
SSP2-4.5	Medium-term	46	61	71	83	93	98	102	107	117	124
	Long-term	46	63	74	89	100	106	111	117	128	136
SSP5-8.5	Medium-term	49	64	74	87	96	101	105	110	119	126
	Long-term	47	65	76	92	103	110	114	121	133	141

Routine event — Design event — Extreme event

		T (Return period)									
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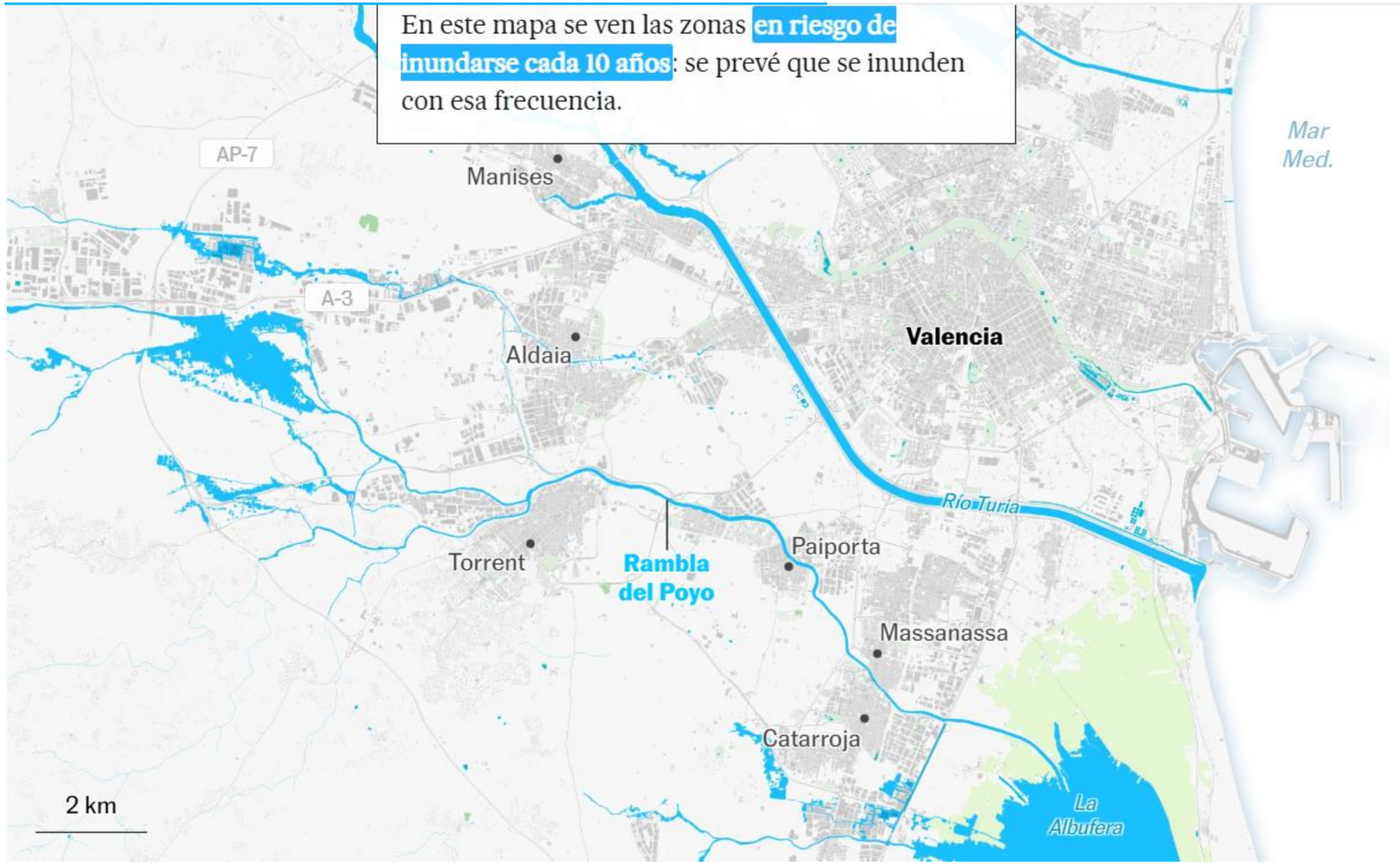


Source: www.elpais.com

1. What did we do: RERA Temp

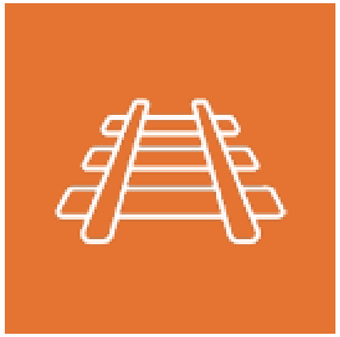
RERA
Resilient Railways facing High Temperatures

#	Topic	Working Group members	Results
1	**Climate data and projections**	UIC, RFI, SNCF, SBB, RSSB, CEMOSA	Different scenarios for short-, medium- and long-term temperature projections
2	**Track buckling**	UIC), CEMOSA RFI, RSSB, SAR, SNCF, SBB, ADIF	Assets most affected by heat. Methodology for the adaptation of the network to the new context.
3	**Assets affection**	SAR, CEMOSA, UIC, RFI, SBB	Affectation of other assets
4	**Sand contamination**	SAR, CEMOSA, UIC	Different effects of ballast contamination by sand.
5	**Vegetation management**	SBB, CEMOSA, RFI, RSSB, FTIA, SAR	Direct effect of increased plant growth on safety and trains operation.
6	**Human factors**	SNCF, CEMOSA, AMTRAK, SBB, FTIA, UIC	Affect of heat on people (railway workers and passengers)
7	**Rolling stock**	SNCF, CEMOSA RSSB	How to adapt our trains to the new climate reality
8	**Resilience and Vulnerability KPIs**	CEMOSA, UIC	Methodology for vulnerability assessment, consistent with RERA Rain

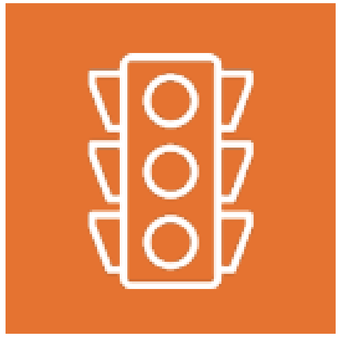
1. What did we do: RERA Temp

RERA
Resilient Railways facing High Temperatures

Most impacted asset



Track
(ballast, rail, turnover, and fastening)



Signalling systems

Electrification system

Locomotive and rolling stock

Most impacted operational aspect

Speed restriction

Cancelled operations

Delayed operations

Passenger comfort

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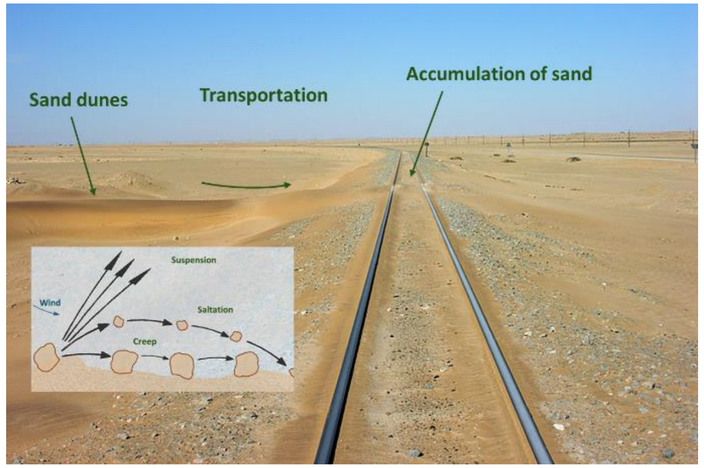
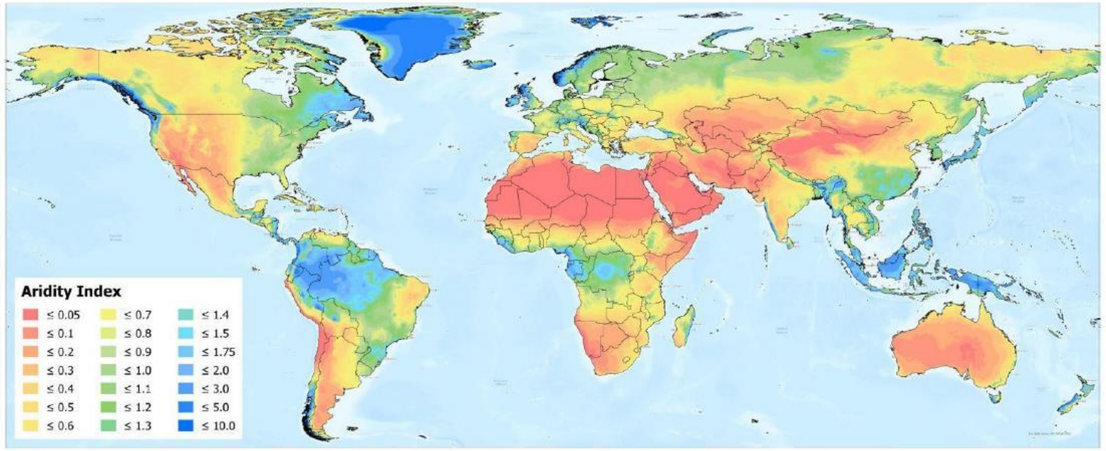
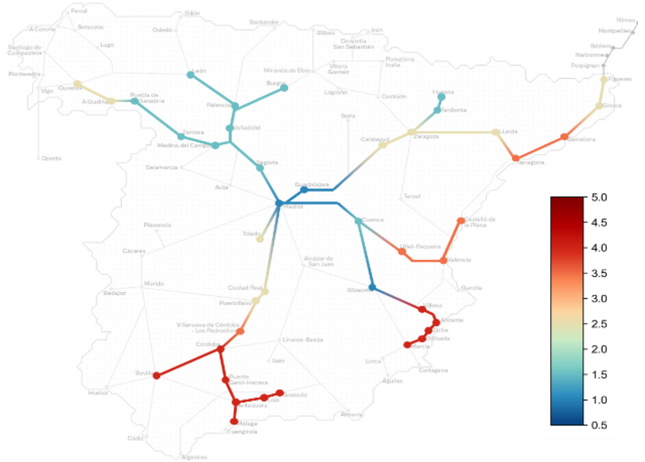
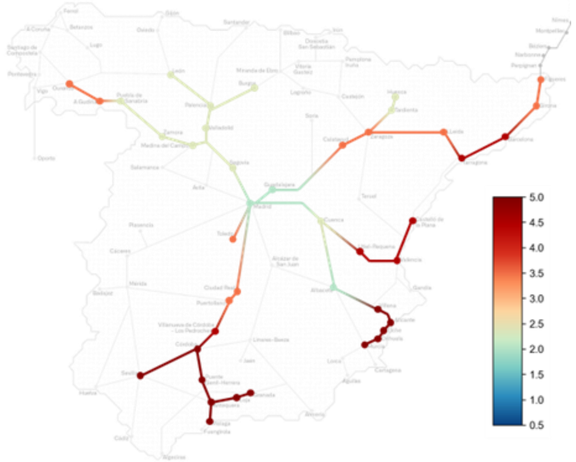




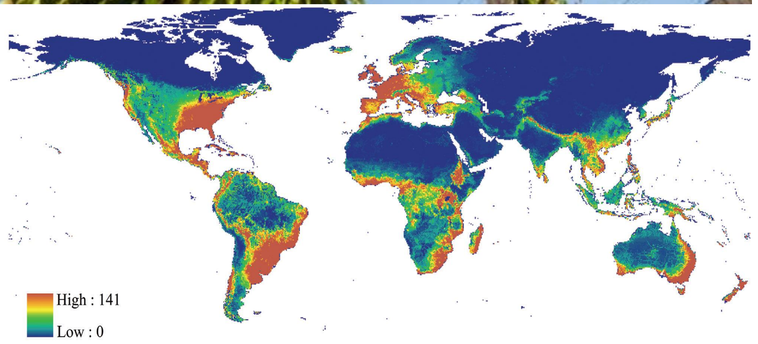


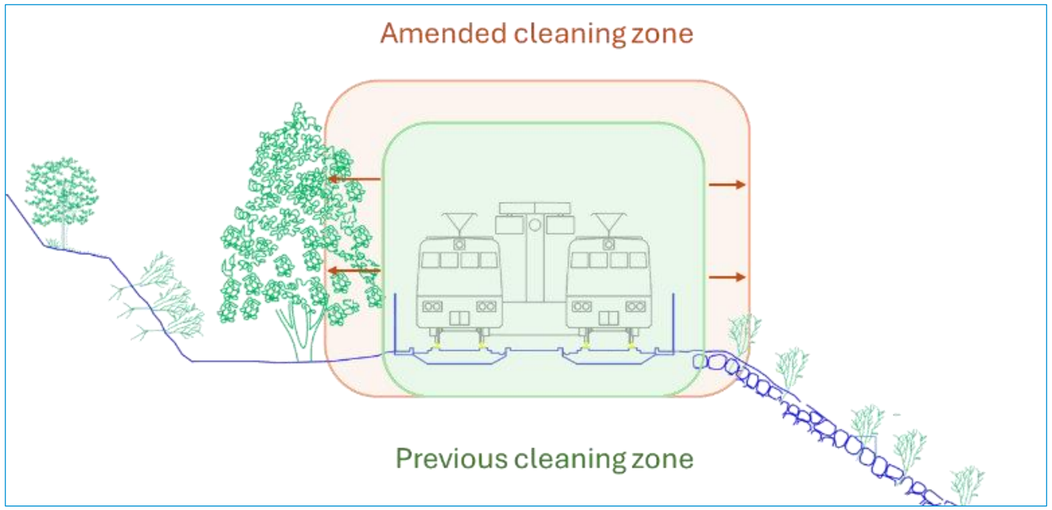
Long-term horizon SSP2-4.5



Long-term horizon SSP5-8.5

1. What did we do: RERA Temp





2. What is on today: RERA Wind

Objectives:

Due to the Great Belt Bridge accident in 2019, the ERA started the JNS process to ensure the operation of goods trains against side winds. The UIC, for its part, started a project in March 2024.

Achievements to date:

The objectives of the JNS have been coordinated with those of the UIC project and the UIC members and work will be carried out on the cross-wind curves (CWC) of the semi-trailers as a first step.

Main tasks:

A state-of-the art on wind measuring systems and devices aimed at safety of operations will be elaborated. Calculations and tests will be carried out in the wind tunnel, to allow all stakeholders to properly assess the risk.

Propose operational rules for a safe operation (non-structural measures) and structural measures, like in bridges.

Planned end date: december 2026.

3. What are we going to do

RERA Cyber

Starting on January 2025

Adif & Renfe (Es)
Bane NOR (Nor)
FS (Ita)
FTIA/VÄYLÄ (Fin)
ÖBB (Aus)

RERA Adhesion

Questionable start for lack of interest

Bane NOR (Nor)
FS (Ita)
RSSB (UK)

RERA Contingency

Starting on January 2025

Bane NOR (Nor)
DB AG (Ger)
FS (Ita)
RSSB (UK)

RERA Quake

Questionable start for financing issues

FS (Ita)
IP SA (Por)
Israel Railways
JP East (Jap)
EFE (Chile)
TCDD (Turkey)

RERA Task Force

Starting on March 2025

UIC Members
UIC Collaborators
Consultancy firm

4. How we are going to do

1. Kick of the task force
March 2025

2. Open points related to Resilience

3. Ideas for new projects

For example:
- Calculation of resilience indices
- Continue with ideas from completed projects
- Monitoring the effectiveness of proposals

4. Coordinate collaboration with other trasnporting modes

5. Specific proposals to Standars and Regulations

6. Bimonhly meetings (online)

7. Avoid double work and Communication

4. How we are going to do

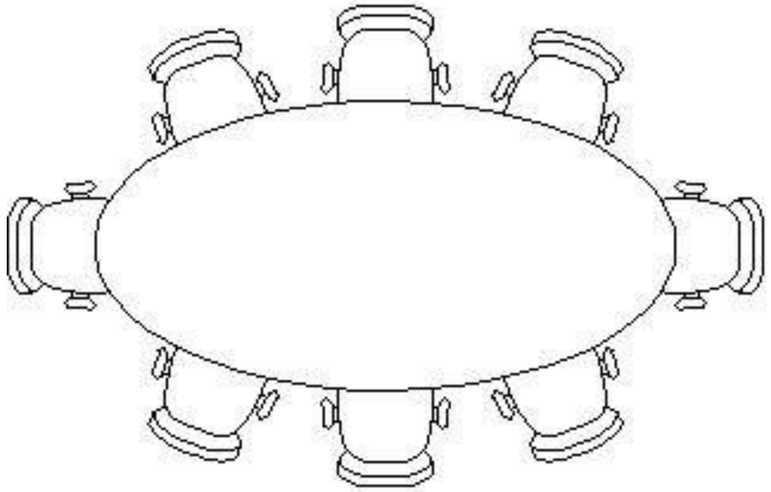
27th March 2025: UIC Conference in Paris

Presentation of the RERA Documents

Places are limited!

5. International coordination

- Operations and Safety
- *Sustainaibility*
- *Infrastructure*
- *Rolling stock*
- *R&I*
- *Consultancy firm*



- Other transportation modes
- External experts (tbc)

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Thank you
for your attention

CONTACT

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