INTERNATIONAL UNION
OF RAILWAYS

RERA

Resilient Railways facing Climate Change

Global Impact Global cooperation

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International Union of Railways
Chair and Vice-chair of the transport system resilience taskforce

Fostering close cooperation links

with all actors in the rail transport domain

Preparing and publishing **Reports, Specifications, Guidelines, IRS**

The worldwide organisation for the promotion of rail transport

200 members

on all 5 continents

Understanding the business needs

of the rail community

Developing innovation programmes

to identify solutions to those needs

15 years of best practice sharing on Climate change Adaptation and Weather resilience

ARISCC

Adaptation of Railway InfraStructure to Climate Change

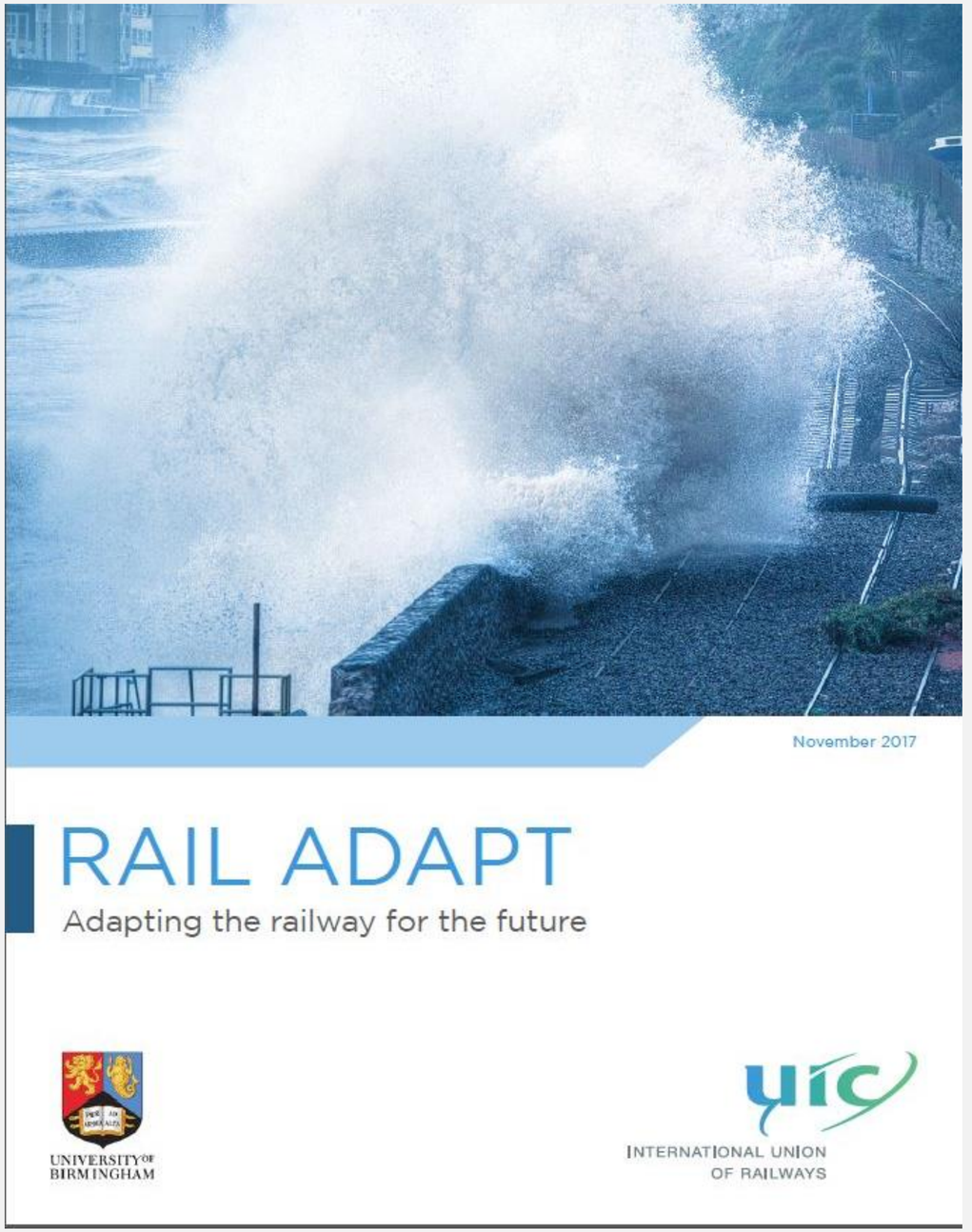
- ARISCC
  - Objectives
  - Scope
- ARISCC Results
  - Final Report (Draft)
  - Recommendations
  - Guidance Document
  - Good Practice
  - **Overview**
    - Weather Warning
    - Event Rec./Database
    - Impact Assessment
    - Vulnerability Mapping
    - Risc Assessm.& Managm.
    - Asset Management
    - Reg. Climate Modelling
  - Case Studies
  - Adaptation of Standards
  - References
- ARISCC Partners
  - UIC
  - DB
  - IZT (Project executive)
  - ÖBB

Good Practice Overview

Please select a value

Area covered

Weather Warning	4
Event Recording/Database	2
Impact Assessment	5
Vulnerability Mapping	3
Risc Assessment & Risk Management	9
Asset Management	3
Regional Climate Modelling	2



The RERA Programme

Resilient Railways facing Climate Change

RERA Contingency 2025

RERA Quake 2025

RERA Cyber 2025

Broader Resilience Themes

RERA Temp 2022-24

RERA Rain 2022-24

RERA Wind 2024-26

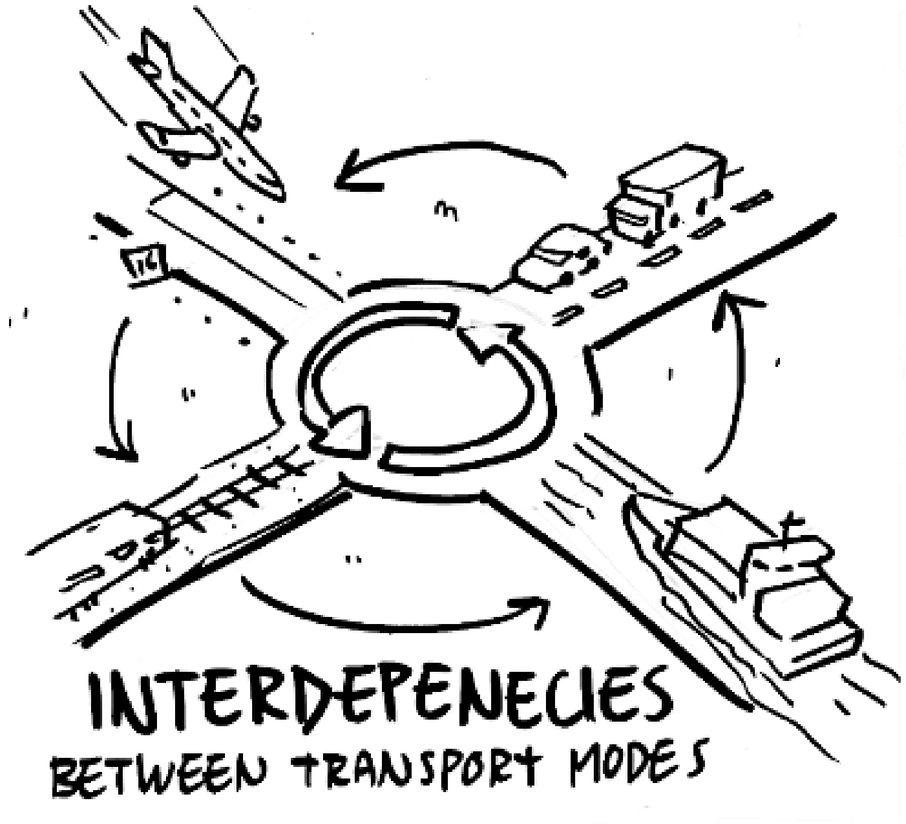
RERA Elec 2026

Climatic Themes

RERA Hub

2026 - ∞

Coordinating and long-term activity



UITP ADVANCING PUBLIC TRANSPORT

ACI AIRPORTS COUNCIL INTERNATIONAL

PIANC The World Association for Waterborne Transport Infrastructure

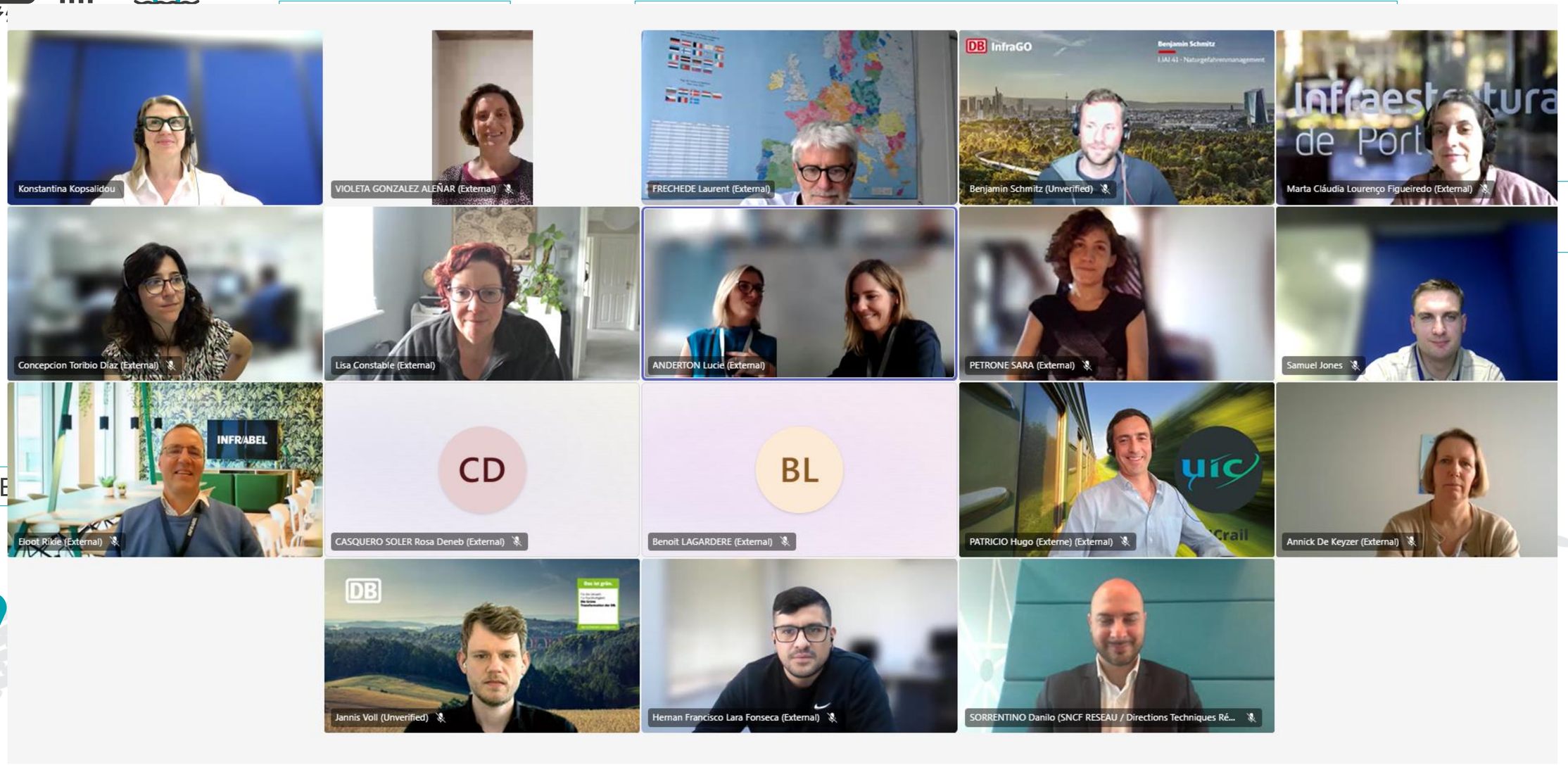
PIARC WORLD ROAD ASSOCIATION

UIC INTERNATIONAL UNION OF RAILWAYS

KNOWLEDGE-SHARING

COLLABORATING AND COOPERATION

Global Participation in the RERA Network



RERA

Resilient Railways facing Heavy Rains

Addressing Extreme Precipitation and Flooding

Examines the vulnerabilities of railway infrastructure to heavy rainfall and associated flooding

Landslide in 2021, Italy

Bridge collapse in 2021, Germany

A structured, three-phase framework:

1. Climate impact analysis

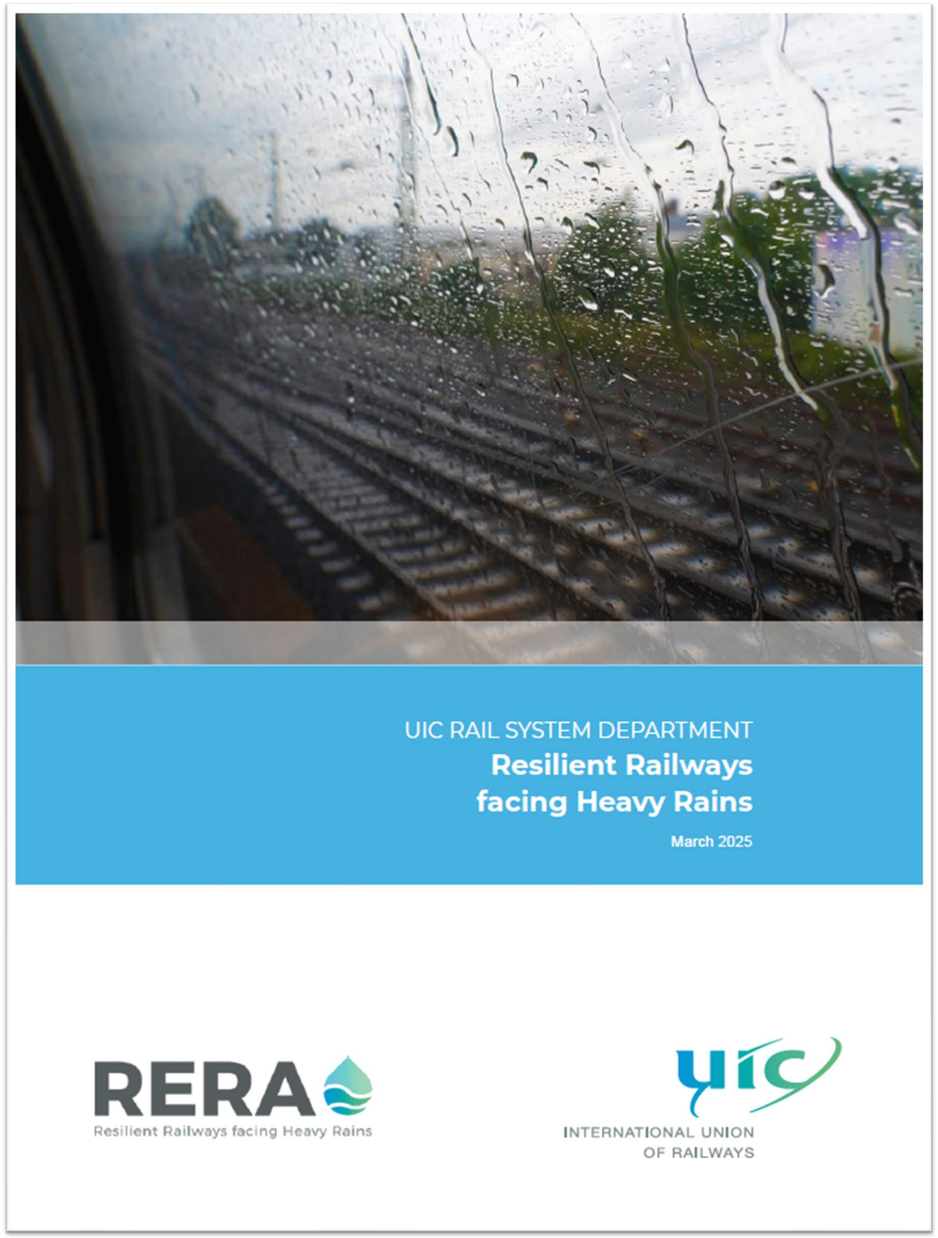
2. Vulnerability, risk and criticality assessment

3. Adaptation planning

Integrating enhanced weather forecasting

Improving inspection protocols

Fostering strengthened collaboration



	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

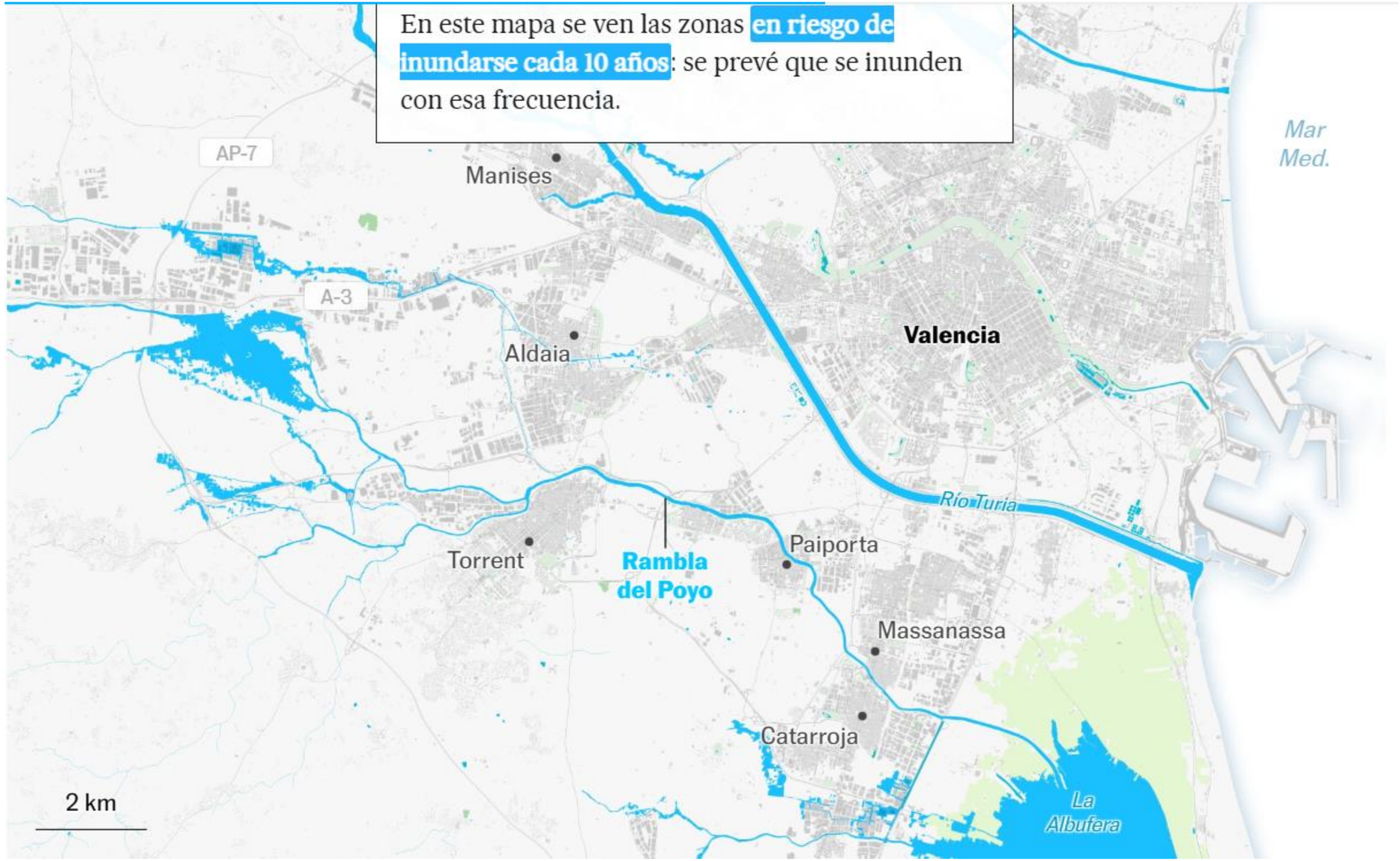
		T (Return period)									
		2	5	10	25	50	75	100	150	300	500
SSP2-4.5	Medium-term	46	61	71	83	93	98	102	107	117	124
	Long-term	46	63	74	89	100	106	111	117	128	136
SSP5-8.5	Medium-term	49	64	74	87	96	101	105	110	119	126
	Long-term	47	65	76	92	103	110	114	121	133	141

Routine event — Design event — Extreme event

		T (Return period)									
		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

Resilient Railways facing Heavy Rains



Source: www.elpais.com

RERA

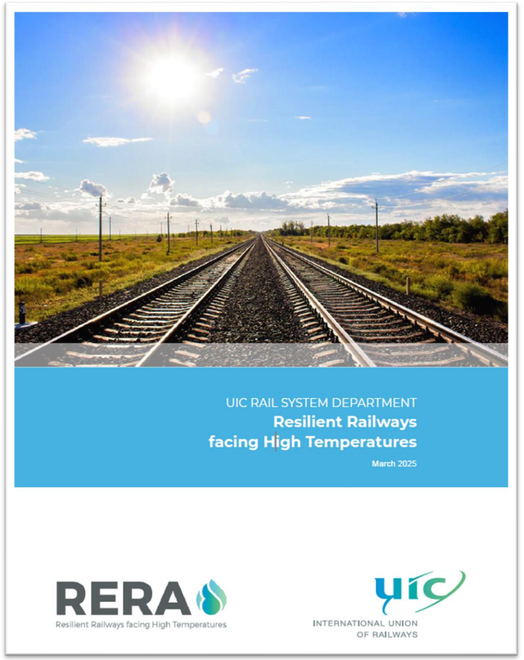
Resilient Railways facing High Temperatures

Most impacted asset

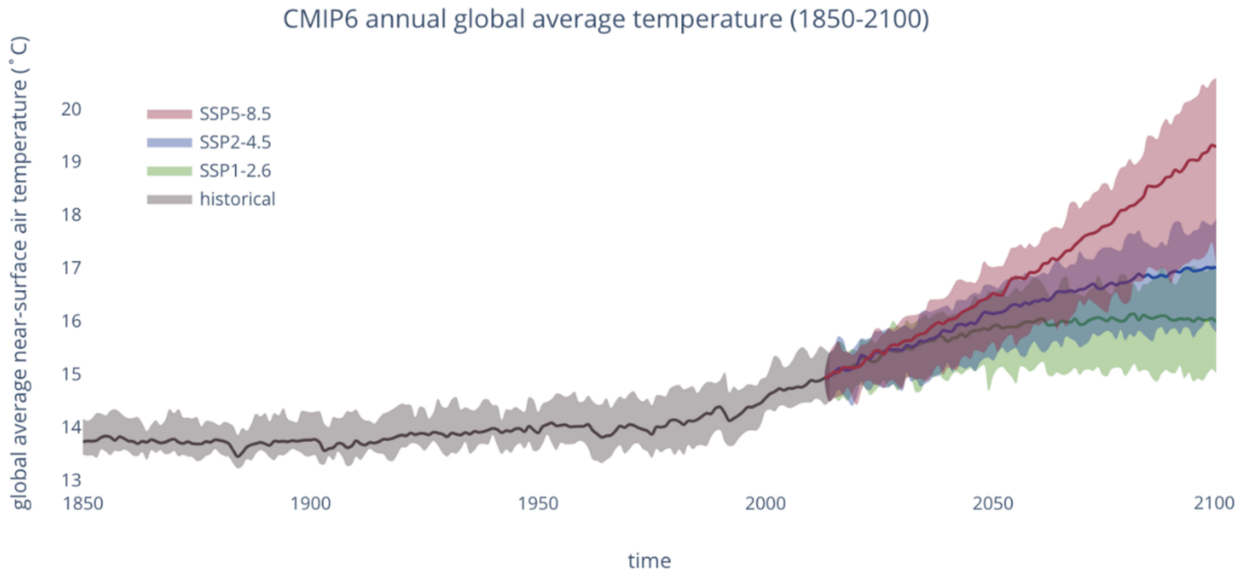
- Track (ballast, rail, turnover, and fastening)
- Signalling systems
- Electrification system
- Locomotive and rolling stock

Most impacted operational aspect

- Speed restriction
- Cancelled operations
- Delayed operations
- Passenger comfort

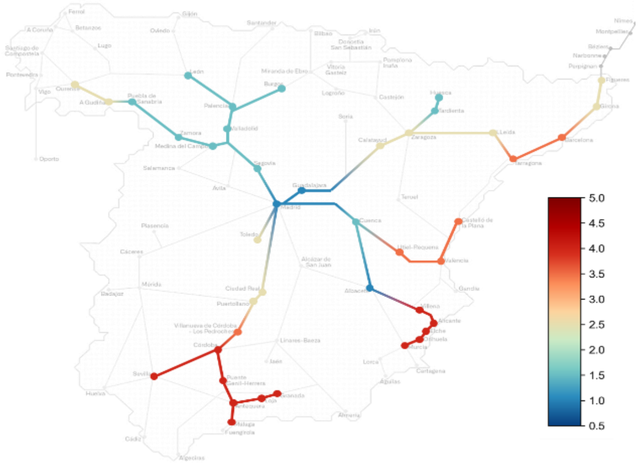


Resilient Railways facing High Temperatures

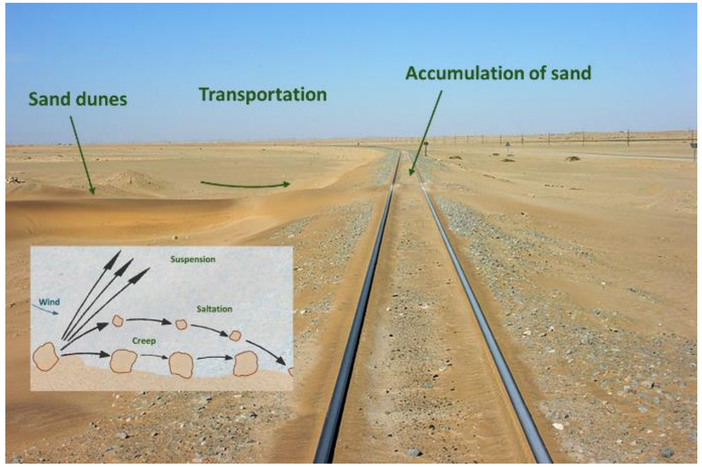


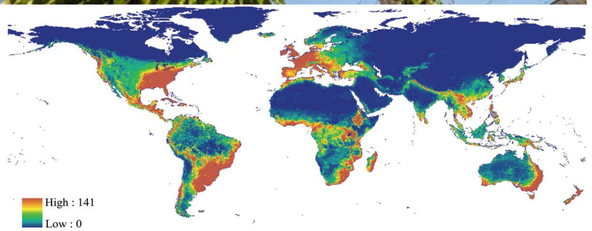
Managing Extreme Temperatures and Desert Conditions

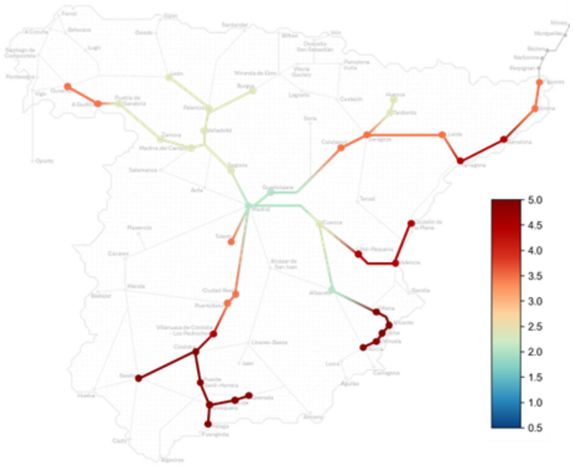
Focusing on the pervasive impacts of rising temperatures and desert environments including sand contamination



Long-term horizon SSP2-4.5

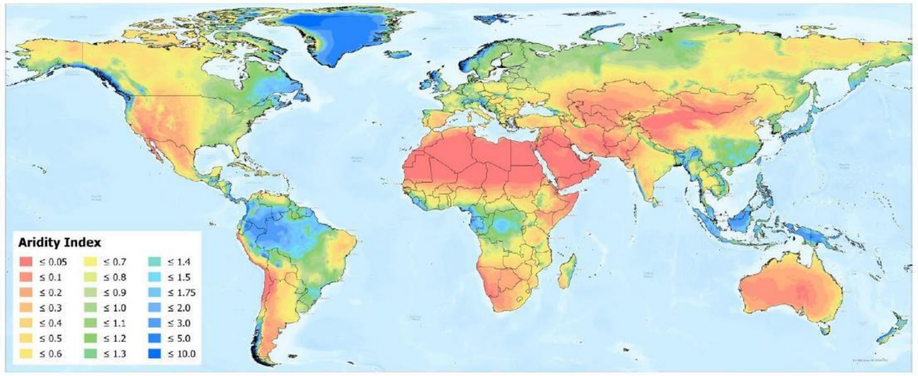


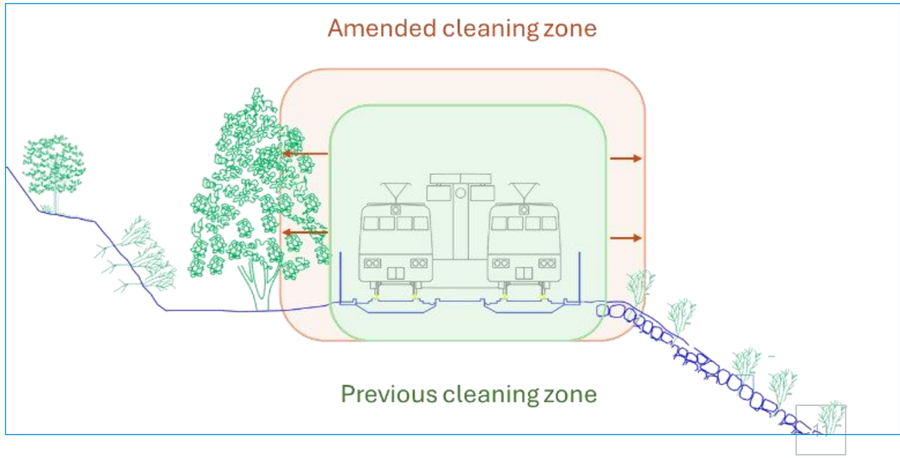




Long-term horizon SSP5-8.5

Long-term horizon SSP5-8.5





RERA

Resilient Railways Facing High Winds

Objectives:

Great Belt Bridge accident (2019) - the ERA started the JNS process to ensure the operation of goods trains against side winds.

Achievements to date:

Objectives of the JNS coordinated with UIC project - work will be carried out on the cross-wind curves (CWC) of the semi-trailers

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.

Completion June 2027

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Thank you
for your attention

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