

Transportation System-level Resilience – Challenges and Solutions

ERA Rail Resilience Study – preliminary results

Idriss Pagand, Eva Valeri

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- First [Rail Environmental Report](#) (2024), identification of data gaps on rail resilience to extreme weather events
- TSIs revision request of the European Commission (2024) includes the task to perform a study on rail resilience to climate change with the following objectives:
 - Collecting data to build an overview at European scale of the frequency and consequences of extreme weather events (1st phase)
 - Assessing and if relevant, proposing changes to the technical European legal framework that could contribute to increase resilience of the railway system (2nd phase)
- No definition *stricto sensu* of ‘extreme weather event’ so elements from Railway Safety Directive have been used i.e. angle of consequences taken:
 - ‘Extensive damage’: at least **EUR 2 million** in total; and/or
 - ‘Extensive disruption to traffic’: train services on a railway line are **interrupted for 6h** or more.
- Geographical scope and time span covered:
 - European Union + Norway, Switzerland and United Kingdom
 - 2005-2024 (last 20 years)

30+ documents
reviewed
7 organisations
consulted

Scope of the study Desk research Targeted bilateral interviews	Data collection from main IMs in each European country
Bilateral interviews on more qualitative inputs with main IMs in each European country	Survey to the NSAs on their role in supervision, SSC/SA, APS

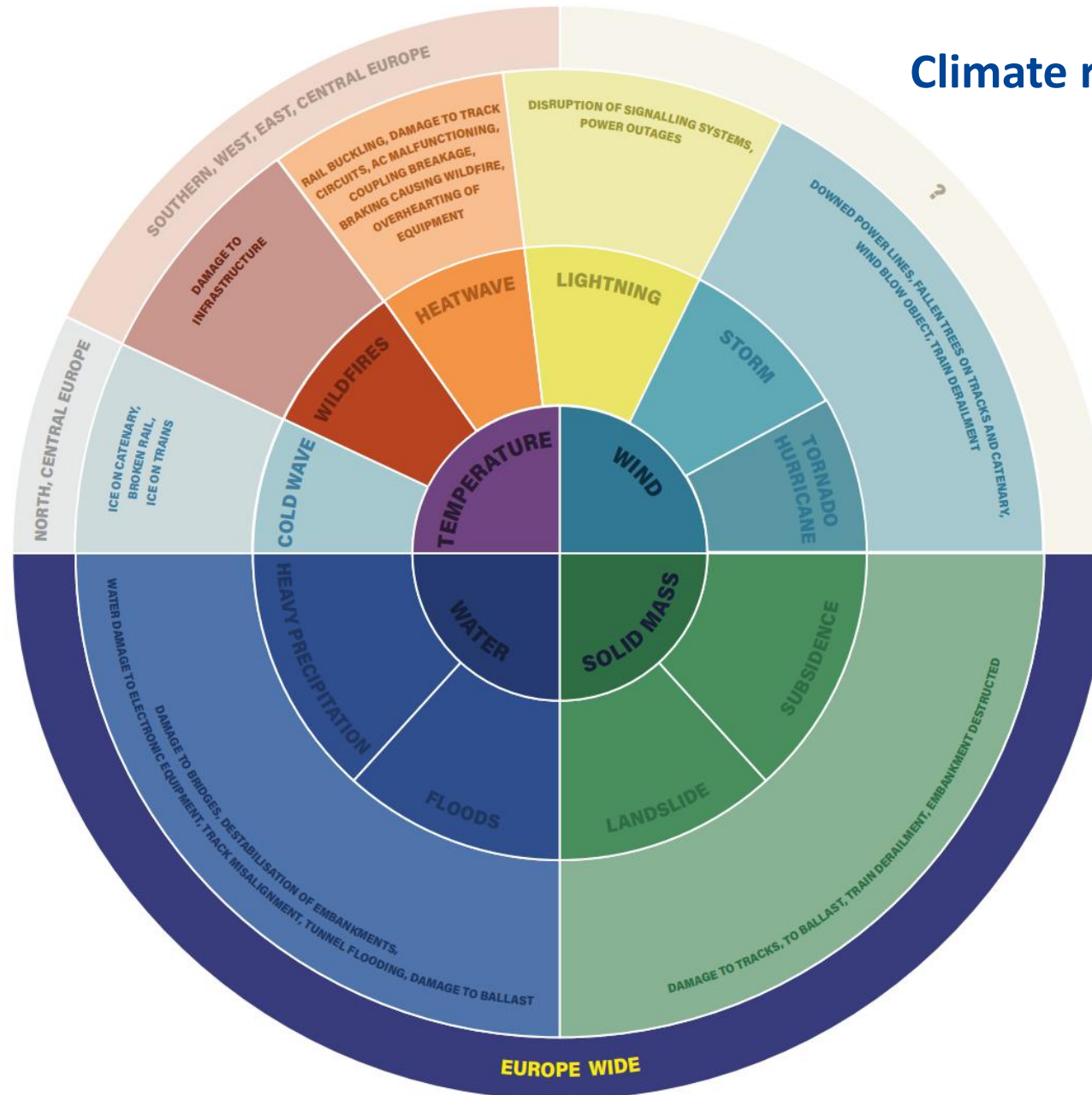
22/28 respondents
(about 80% response
rate) – 20/22 with
data (77% of the
network covered)

28/28 respondents
(100% of response
rate and network
covered)

14 out 27 NSAs
replied
(about 50%
response rate)

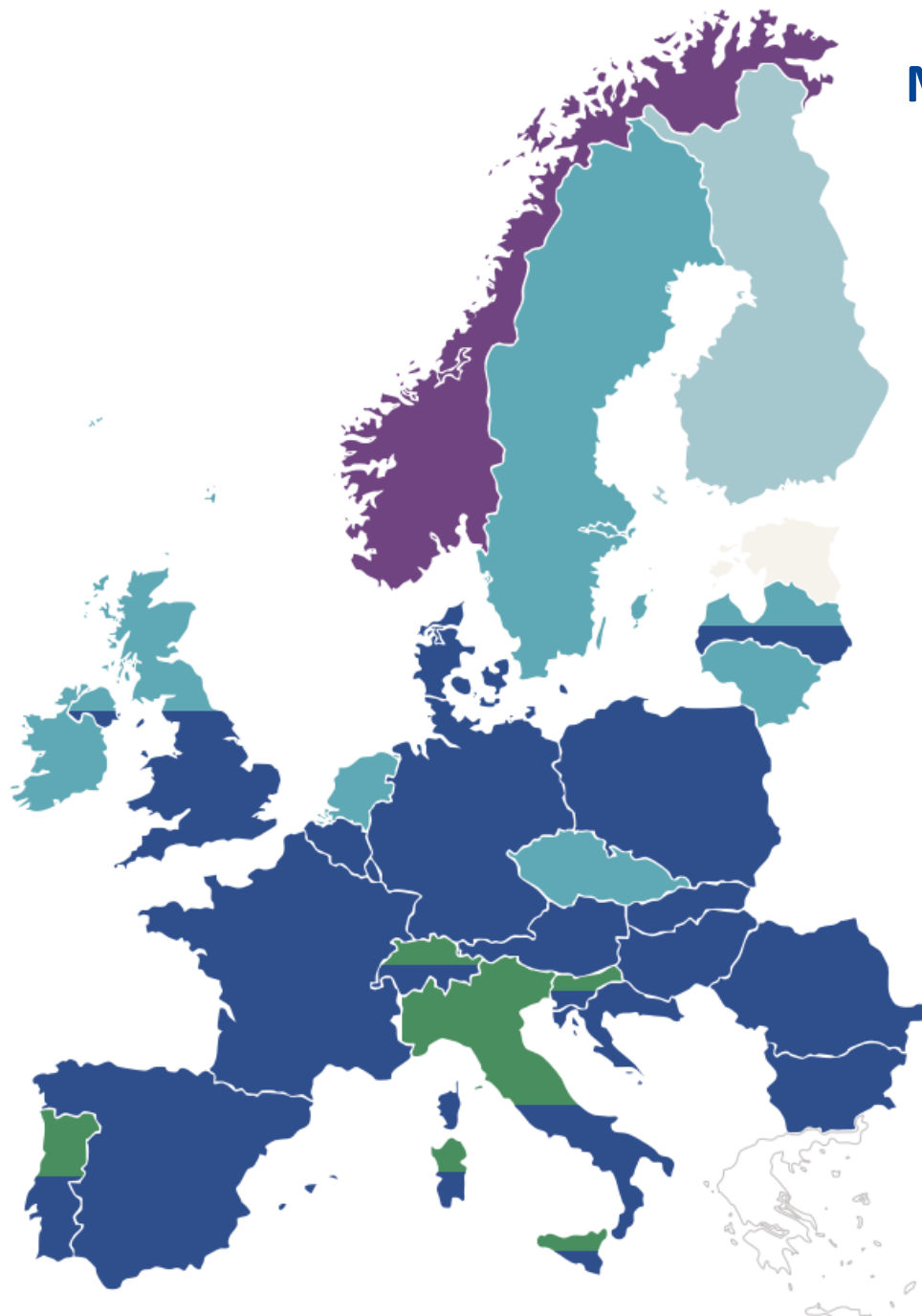
Climate railway risks wheel

- INNER CIRCLE :**
CLIMATE PRESSURE
- SECOND CIRCLE :**
CLIMATE HAZARDS
- THIRD CIRCLE :**
RAILWAY RISKS
- OUTER CIRCLE :**
GEOGRAPHICAL SCOPE



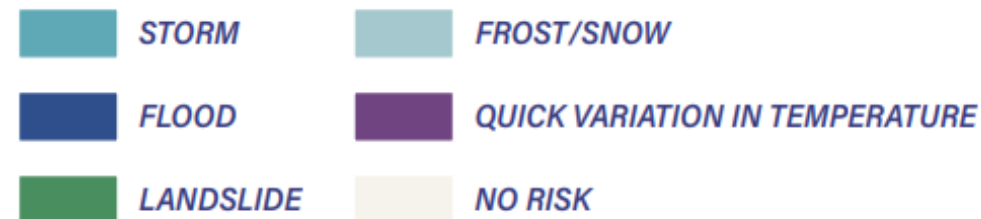
REDUCED LEVEL OF SAFETY
INCREASED COSTS OF MAINTENANCE AND REPAIR/REBUILT
REDUCED AVAILABILITY OF SERVICES (DELAYS, CANCELLED TRAINS)

Main climate hazard(s) identified per country



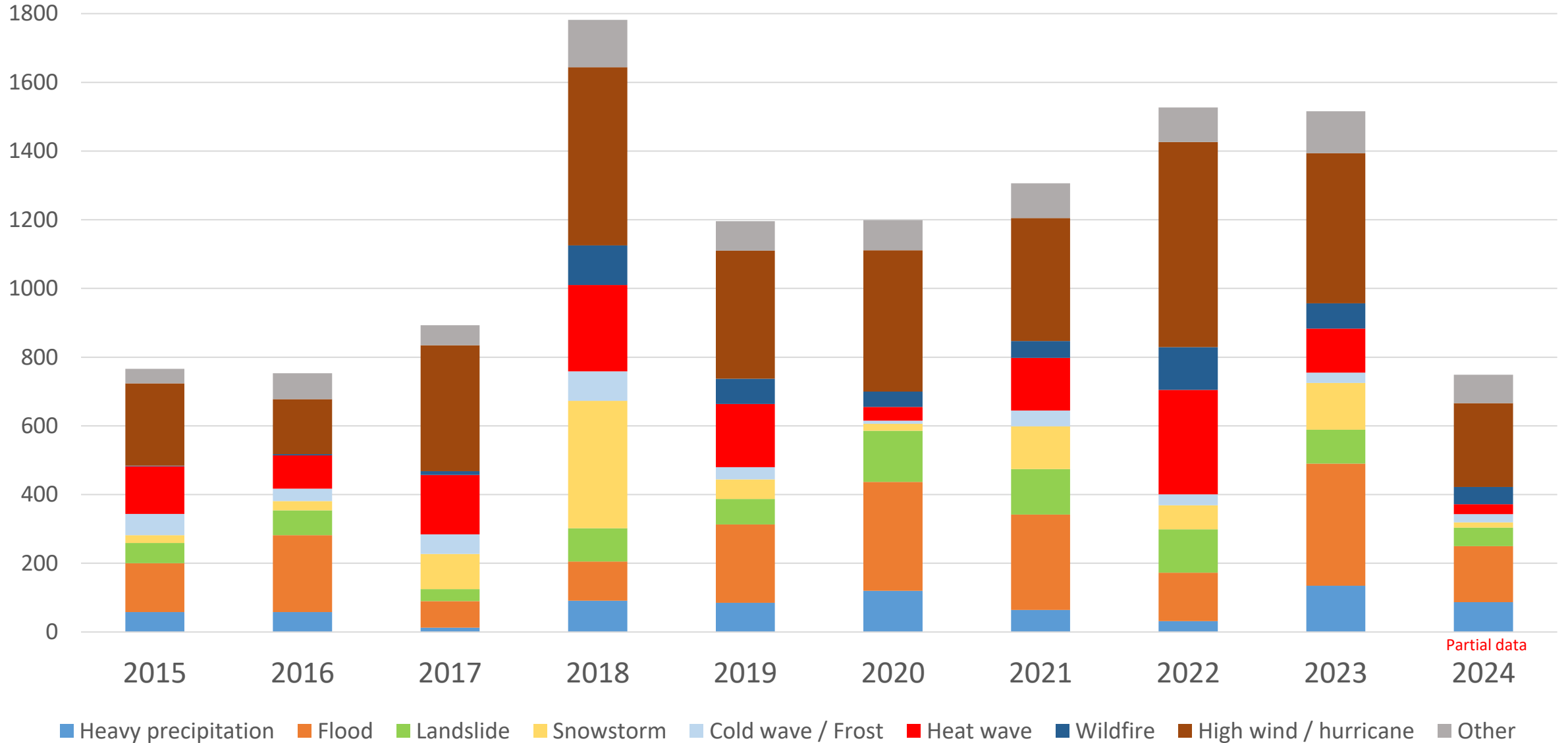
71% of the IMs (20/28)
representing 83% of the network covered
**perceived an increase of the weather events'
impact on rail operation and infrastructure.**

Different indicators used such as
delayed/cancelled trains due to
meteorological conditions, increase in
exceptional maintenance costs.



Trend of extreme weather events affecting EU railway system (EU, CH, UK)

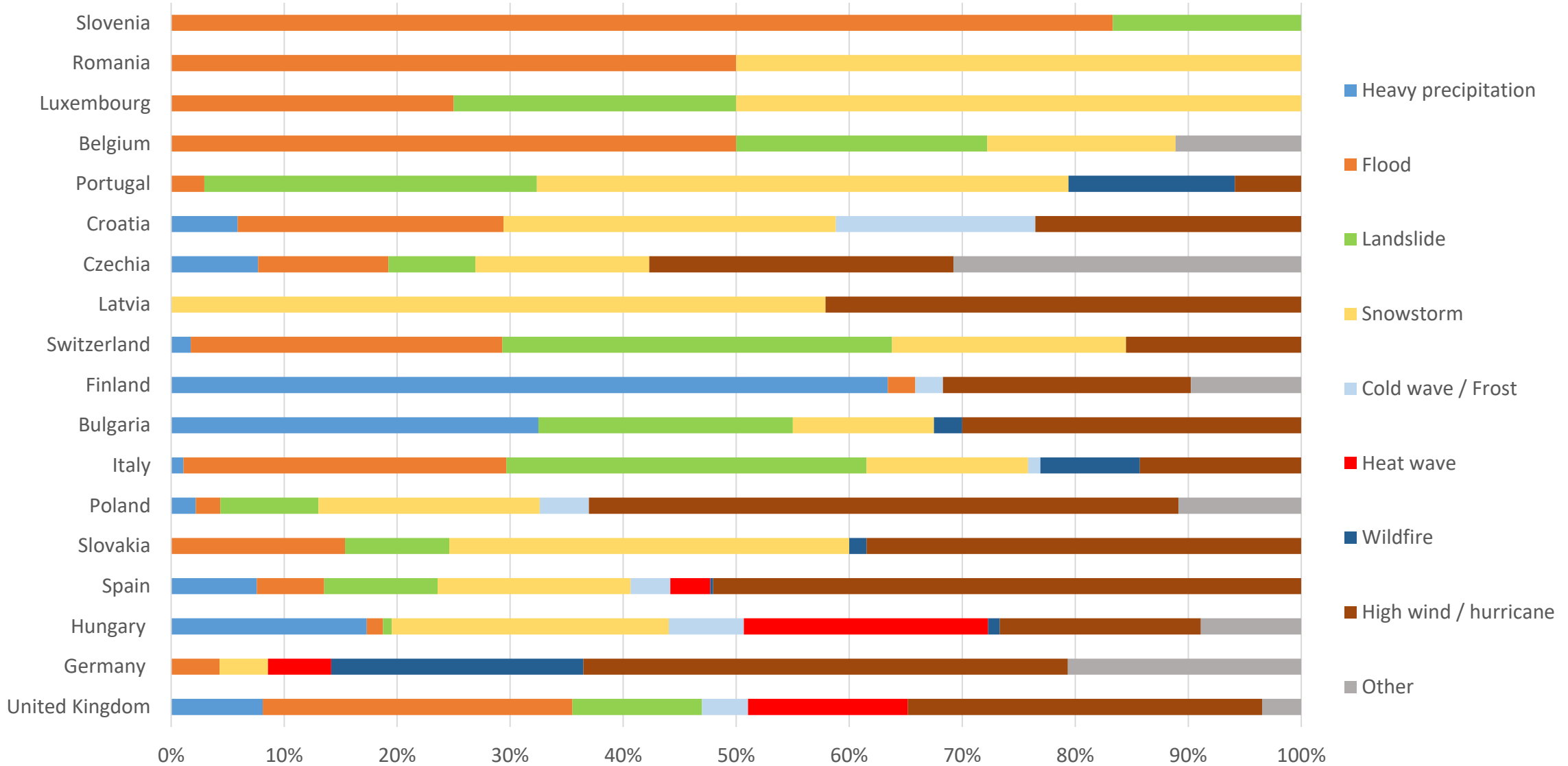
Preliminary results



Partial data

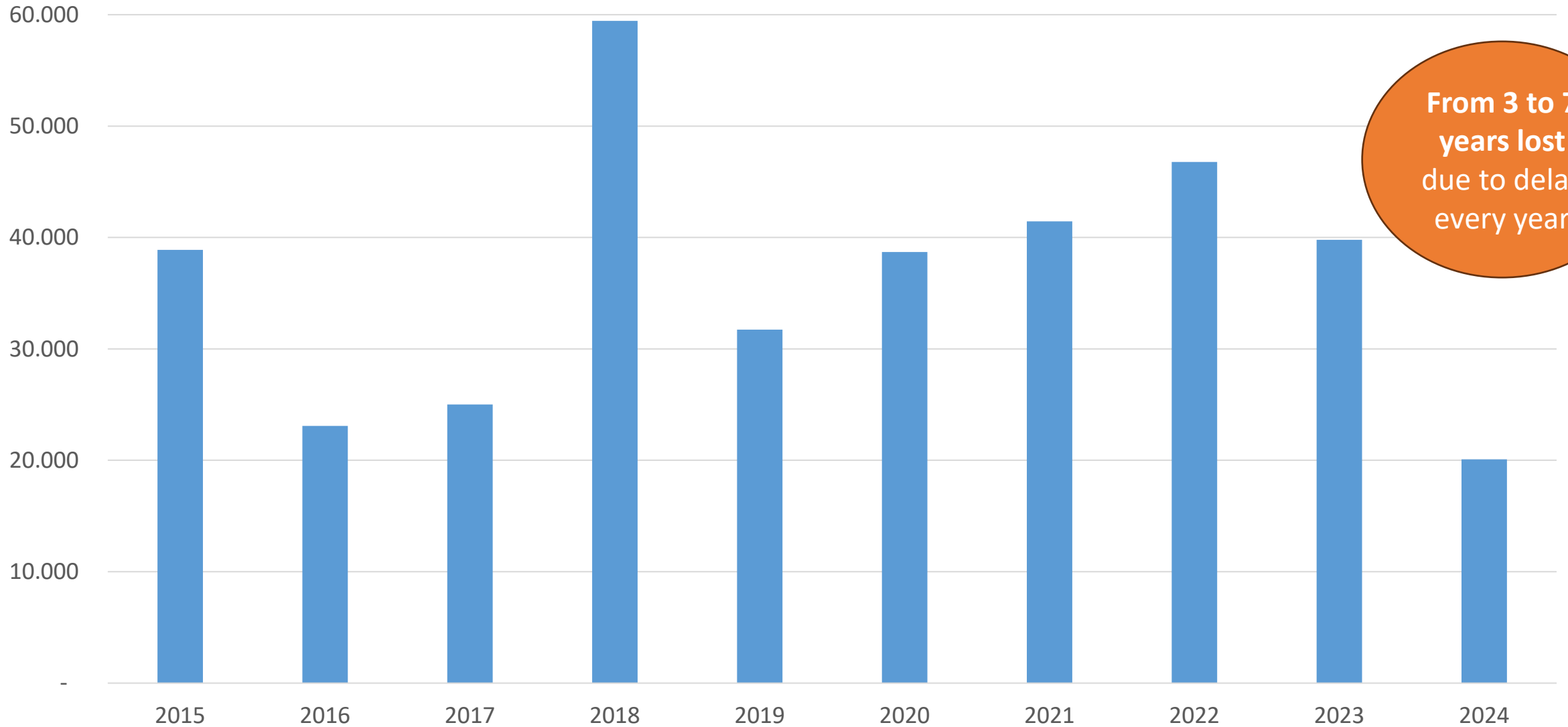
Extreme weather events by country (EU, CH, UK)

Preliminary results



Railway delays in hours due to extreme weather events (EU, CH, UK)

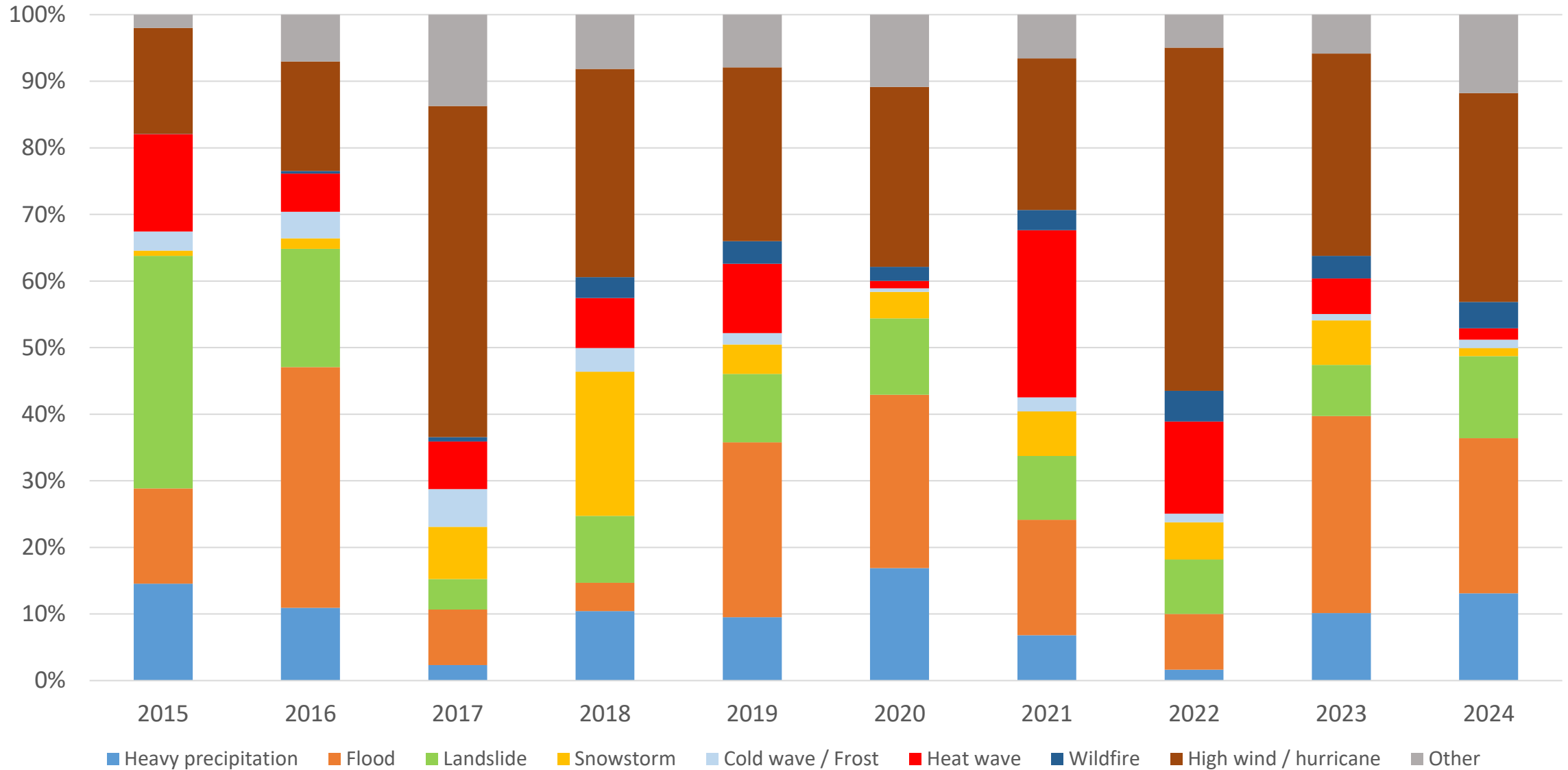
Preliminary results



**From 3 to 7
years lost
due to delay
every year**

Railway delays linked to extreme weather events (EU, CH, UK)

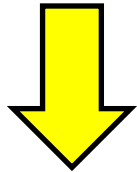
Preliminary results



Main challenges expressed by IMs

1

Data collection and IT management of big data



37% of the IMs systematically collect data and analyse them.

33% have different databases not interconnected or collect data but without linking them to the cause.

30% have limited data collection

2

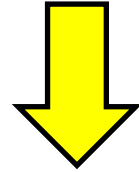
Budget constraint

3

Internal change management and decision making process

4

No common methodology (e.g. risk assessment, climate projection)



26% no climate projection / 37% no adaptation plan

33% climate projection on certain locations / 11% in the process of doing an adaptation plan

41% uses climate projection / 52% have an adaptation plan or a national plan with railway infrastructure covered

Final goal

**Building well
prioritised
investment plans**

Planned activities:

- Internal review of the draft report – September 2025
- Comments from sector – October 2025
- Workshop to exchange on report and proposals – 13th of November 2025

Timeline and deliverables:

- Draft report (available to consulted organisations) – end of September 2025
- Final report sent to European Commission – end of 2025
- Final report publicly available – first quarter 2026

Thank you

Moving Europe towards a sustainable and safe railway system without frontiers.

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