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INTERNATIONAL UNION
OF RAILWAYS

UIC RAILWAY NOISE DAYS

Is the railway a good neighbour?
23 February 2021

#UICRail #Noise days #Sustainability #Rail system



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OF RAILWAYS



François DAVENNE - Director General of UIC

https://uic.org/events/IMG/pdf/f.davenne_uic_railway_noise_days.pdf

Introduction

3



Jakob OERTLI

Chair of UIC's Noise and Vibration Sector - Swiss Federal Railways (SBB)

Lucie ANDERTON

Head of UIC Sustainability Unit - Network Rail (UK)



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The worldwide railway organisation

4

200

members in
95 countries

3,000

billion
passenger-
kilometres

10,000

billion tonne-
kilometres

1

million
kilometres of
line

7

million rail
personnel

Cooperation
with over

100

institutions

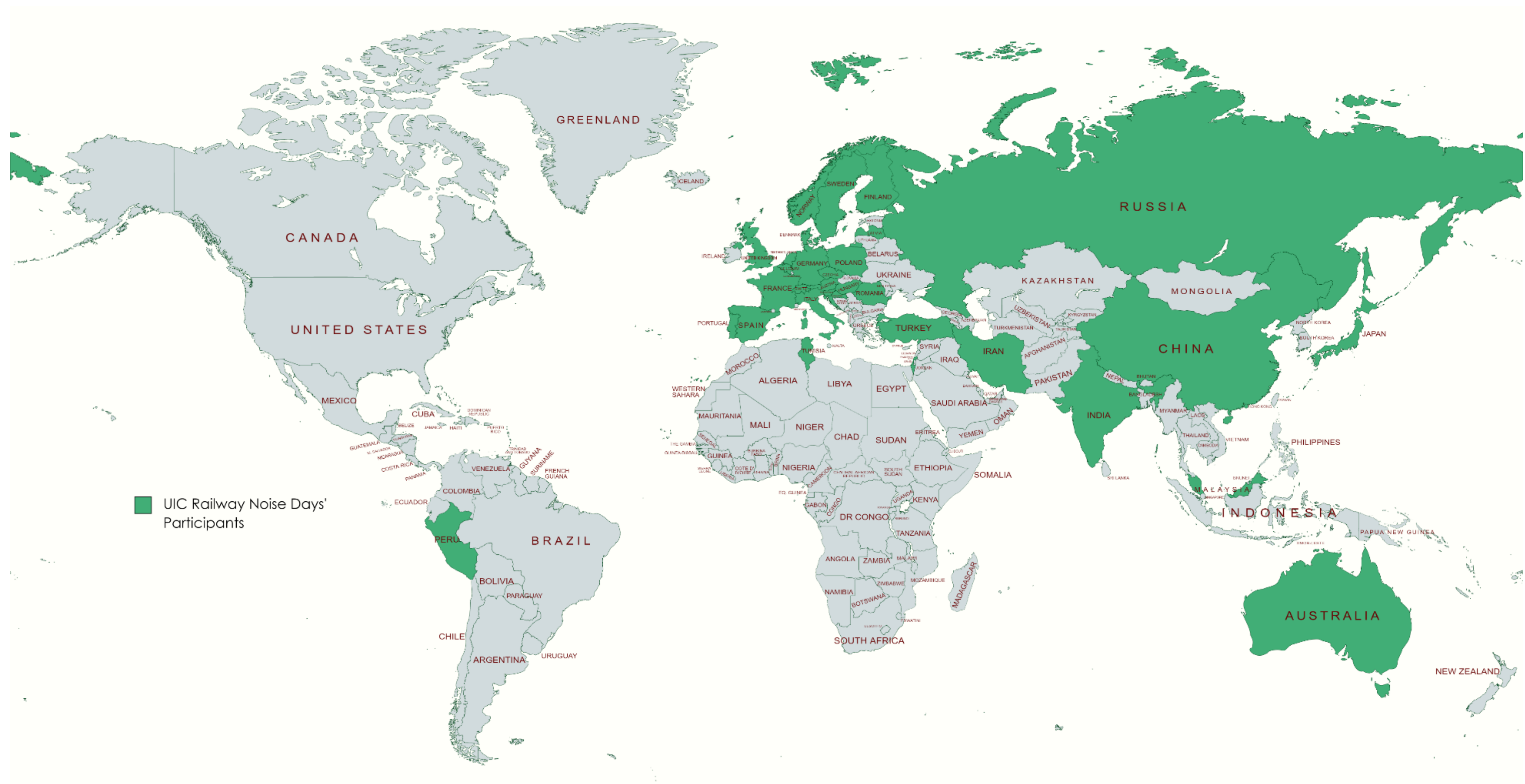
700

UIC leaflets - new
International
Railway Solutions
(IRS)

85

congresses,
conferences,
workshops

Welcome to our Global Audience

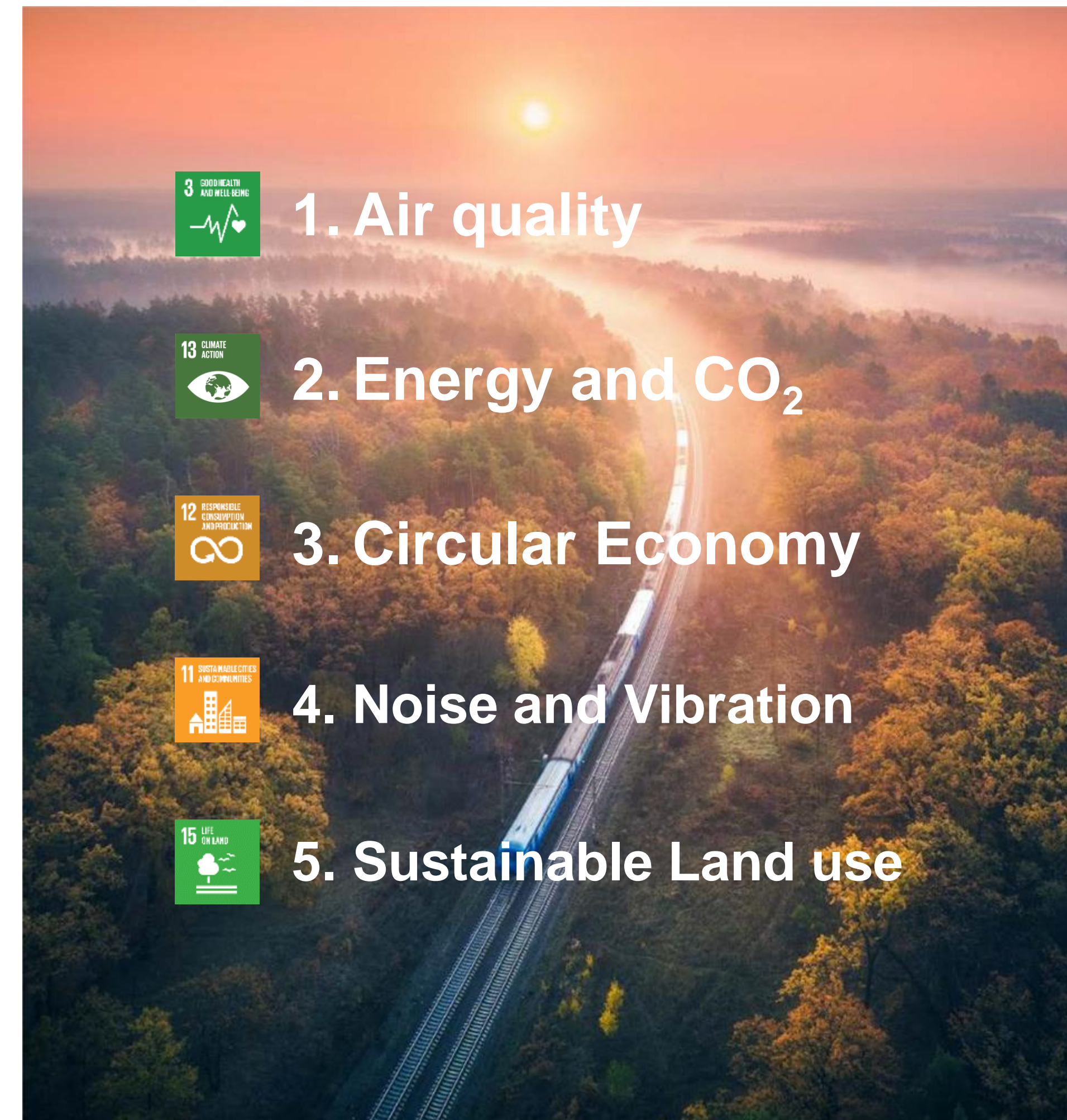


The UIC Sustainability Platform

6

- Set the vision,
- Provide the tools and
- Convene the community.

To empower the global railway community to be a driving force in a green recovery through collaborative knowledge and advocacy.



Is the railway a good neighbour?

Our Vision

A railway that supports a green recovery as the backbone of sustainable mobility. Connectivity that contributes to healthy and sustainable lifestyles and economies on every continent – that is zero emissions, a community hub, accessible for all, and is both biodiverse and a good neighbour.



UIC Railway Noise Days

8

Organised by Sustainability Unit, Noise and Vibration Sector

Moderator: Jakob OERTLI, Chair of the UIC Noise and Vibration Sector & SBB

“Is the railway a good neighbour?”

*** European focus***

09:20 Recent Commission initiatives on rail freight noise - Nino ZAMBARA, EU DG MOVE

09:40 The future of the EU noise policy - Marco PAVIOTTI, EU DG ENV

10:00 Railway noise reduction, policy impacts - Ethem PEKIN, CER

10:20 Q&A

10:30 Coffee break

10:40 - 10: 55 Networking rooms

*** Special topics ***

11:00 European Environment Agency, Environmental noise in Europe 2020 report - Eulalia PERIS, EEA

11:20 State-of-the-art for railway noise in Europe – Pinar YILMAZER, UIC Noise and Vibration Sector & Wout SCHWANEN, M + P Raadgevende Ingenieurs BV

11:40 UIC Train Track Interaction Acoustic White Paper - Pierre Etienne GAUTIER, SNCF Réseau

11:50 Q&A + Concluding remarks

12:20 Closed

UIC Railway Noise Days



23-24 February 2021
ONLINE



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#UICrail

#Noise days #Sustainability #Rail system

- 09:20 Recent Commission initiatives on rail freight noise
Nino ZAMBARA, EU DG MOVE
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INTERNATIONAL UNION
OF RAILWAYS



Nino ZAMBARA

**European Commission Directorate General for Mobility and Transport (EU DG MOVE)
Policy Officer**



European Commission

DG MOVE

UIC Railway Noise Days

23 February 2021

Overview

- Sustainable and Smart Mobility Strategy
- Developments since 19 March 2019, 12th Workshop on Railway Noise
- European Year of 2021

SUSTAINABLE & SMART **MOBILITY STRATEGY**

Putting European
transport on track for
the future



The Strategy

Our vision for the future of European transport and mobility

KEY ELEMENTS

- **Three objectives:** making the European transport system more **sustainable, smart and resilient**
- **10 flagship areas** with key **milestones**
- **Action plan** with a list of concrete policy actions
- Comprehensive **Staff Working Document**

Milestones – 2030/35

By 2030

- Min. 30 million zero-emission cars and 80 000 zero-emission lorries in operation
- Min. 100 climate neutral cities
- **Scheduled collective travel under 500 km** should be **carbon-neutral** within the EU
- **Doubled high-speed rail** traffic, rail freight traffic increases by 50%
- Transport by **inland waterways & short sea shipping** increases by 25%
- **Rail & waterborne-based intermodal** will be able to compete on equal footing with road-only transport in the EU
- **Paperless freight** transport
- **Automated mobility** deployed at a large scale
- Integrated electronic **ticketing**
- Operational **multimodal Trans-European Transport Network** equipped for sustainable and smart transport with high speed connectivity (**core** network)
- Zero-emission **ocean-going vessels** ready for market

By 2035

- **Large zero-emission aircraft** ready for market



Milestones – 2050

By 2050

- Nearly all cars, vans, buses as well as new heavy-duty vehicles will be **zero-emission**
- **Doubled rail freight** traffic, **trippled high-speed rail** traffic
- Transport by **inland waterways & short sea shipping** increases by **50%**
- **External costs** of transport within the EU will be **covered by the transport users**
- **Death toll** for all modes of transport in the EU close to **zero**
- Operational **multimodal Trans-European Transport Network** equipped for sustainable and smart transport with high speed connectivity (**comprehensive network**)

AN IRREVERSIBLE SHIFT TO ZERO-EMISSION MOBILITY

- Making all transport modes more sustainable,
- Making sustainable alternatives widely available in a multimodal transport system,
- Putting in place the right incentives to drive the transition.



SUSTAINABLE



FLAGSHIP AREAS

- **FLAGSHIP 1 - BOOSTING UPTAKE OF ZERO-EMISSION VEHICLES, RENEWABLE & LOW-CARBON FUELS AND RELATED INFRASTRUCTURE**
 - Explore the benefits of retrofitting and renewal schemes in various transport modes
- **FLAGSHIP 2 - CREATING ZERO-EMISSION AIRPORTS AND PORTS**
- **FLAGSHIP 3 - MAKING INTERURBAN AND URBAN MOBILITY MORE SUSTAINABLE AND HEALTHY**
 - Action Plan to boost passenger rail transport (2021)
 - Measures to better manage and coordinate international rail traffic, including if necessary through revised rules for capacity allocation and infrastructure charging in rail (2022)



FLAGSHIP AREAS

- **FLAGSHIP 4 - GREENING FREIGHT TRANSPORT**
 - Better alignment of Rail Freight Corridors and TEN-T (2021)
 - Review of the regulatory framework for intermodal transport, including the Combined Transport Directive (2022)
 - Guidelines on informing users about the carbon footprint of their deliveries and on offering sustainable delivery choices (2023)



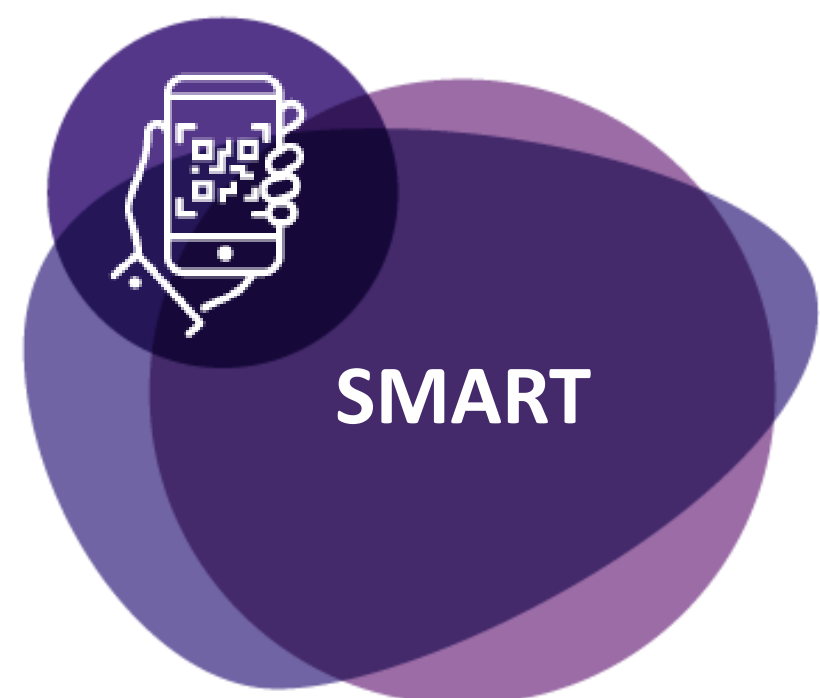
FLAGSHIP AREAS

- **FLAGSHIP 5 - PRICING CARBON AND PROVIDING BETTER INCENTIVES FOR USERS**
 - Revision of Energy Tax, VAT, ETS
 - EU framework for harmonised measurement of transport and logistics emissions
 - Guidelines to inform passengers about the carbon footprint of their trip and to enable passengers to voluntarily offset it

SMART MOBILITY - ACHIEVING SEAMLESS, SAFE AND EFFICIENT CONNECTIVITY

- Offering a seamless multimodal experience
- Supporting sustainable choices by taking advantage of digitalization & automation
- Shaping the mobility of the future
- Ensuring the right framework and enablers are in place





FLAGSHIP AREAS

- **FLAGSHIP 6 - MAKING CONNECTED AND AUTOMATED MULTIMODAL MOBILITY A REALITY**
 - Framework for ticketing across modes
 - Adopt railway technical specifications package on ERTMS/Control-Command and Signalling (CCS); and develop mandatory deployment plans for automatic train operation, automated traffic management and advanced CCS
 - Review the regulatory framework for interoperable data sharing in rail transport
- **FLAGSHIP 7 - INNOVATION, DATA AND AI FOR SMART MOBILITY**
 - Renew Shift2Rail Partnership



A MORE RESILIENT SINGLE EUROPEAN TRANSPORT AREA: FOR INCLUSIVE CONNECTIVITY

- Reinforcing the Single Market
- Helping the sector build back better from the crisis & become more resilient
- Increasing investments, both public and private, in infrastructure and fleets





RESILIENT

FLAGSHIP AREAS

- **FLAGSHIP 8 – REINFORCING THE SINGLE MARKET**
 - Review of Trans-European Transport Networks (TEN-T)
 - Guidance on freight PSO and review of transport relevant State aid rules
 - Assess the impacts of the COVID-19 pandemic on connectivity and competition in the market, and propose follow-up measures as appropriate
 - Prepare crisis contingency plans for the transport sector, including health-safety and operational measures and setting out essential transport services



RESILIENT

FLAGSHIP AREAS

- **FLAGSHIP 9 - MAKING MOBILITY FAIR AND JUST FOR ALL**
 - Review of the passenger rights regulatory framework, including to ensure its resilience to extensive travel disruptions, and including options for multimodal tickets (2021-2022)
 - Revision of the Directive on the certification of train drivers (2022)
- **FLAGSHIP 10 - ENHANCING TRANSPORT SAFETY AND SECURITY**
 - Improve security for passenger rail travel by implementing the results of the action plan on rail security and the Rail Passenger Security Platform (2022)



European
Commission

Mobility and Transport

Rail noise in the strategy

- Action Plan: 21:
 - Zero pollution action plan for air, water and soil; revision of air quality standards and reduction of noise pollution, 2021; 2022
- Reference to TSI Noise and quieter routes per December 2024
- Internalisation of external costs across modes

Developments since March 2019 (1/2)

Revision TSI Noise, Implementing Regulation (EU) 2019/774, 16/5/2019

- Nearly all Member States have notified to ERA their “quieter routes”
- ERA Technical Opinion to remediate potential double notification requirements. Endorsed by the Commission.
- Task Force on performance of composite brake blocks under Nordic winter conditions, reported in May 2020. Work continues.
 - Commission reported in September 2020
- National unilateral measures
- By 31 December 2028, the Commission shall evaluate the implementation of the “quieter routes”

Developments since March 2019 (2/2)

- Evaluation of Implementing Regulation (EU) 2015/429 on noise-differentiated track access charges
- CEF call 2019:
 - Available budget EUR 35 million
 - Allocated budget EUR 19.5 million
 - 8 projects, almost 75 000 freight wagons retrofitted
 - 2014, 2016 and 2019 call combined: 207 000 wagons retrofitted
- Comprehensive study DG Environment



EUROPEAN YEAR
OF RAIL **2021**

HOP ON!

#EUYearofRail

Stakeholder engagement

+170 proposals received so far, some examples of stakeholders' ideas:

- **Exhibitions:** rail heritage, future of rail
- **Project demonstrations:** showcasing innovative prototypes
- European Railway **Award**
- **Competitions**, e.g. Hackathons, internships as 1st prize
- **Performances** in train stations & along the tracks
- Special editions of TV shows on board of trains
- Train **trips to sports events**, festivals, conferences
- **New rail connections** to connect regions, crossing borders
- **Open doors**, Guided tours in control centers
- A day in the life of... train driver, engineer, etc.



EUROPEAN YEAR OF RAIL **2021**

europa.eu/year-of-rail | **#EUYearofRail**

Examples of events planned in 2021*

- 29 March: institutional **launch of the European Year**, co-organised by the Portuguese Presidency and the Commission on the eve of the informal transport Council on rail
- 4-16 June: **European Rail Safety Days**
- Early September: Event on cross-border rail passenger services (Action Plan)
- 16-22 September: **European Mobility Week**
- 14 October: start of the **EUROPALIA** festival (until 14 February 2022)
- 24-26 November: **Shift2Rail Innovation Days**

**Rolling calendar available on the website*



EUROPEAN YEAR OF RAIL **2021**

europa.eu/year-of-rail | **#EUYearofRail**

Thank you for your attention



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Marco PAVIOTTI

**European Commission Directorate General for the Environment (EU DG ENV)
Policy Officer**



The future of the EU noise policy

European Commission
Directorate General for the Environment

UIC 23 February 2021

Marco PAVIOTTI

The future of the EU noise policy

- Why is noise important to tackle?
- What is the EU doing?
- What could the EU further do?
- Conclusions

Why is noise important to tackle?

Noise endangers our health

- WHO – noise guidelines
(53dB road, 54 dB rail, 45dB aircraft)
- Ischaemic heart disease, stroke, stress, bad sleep, cognitive impairment
- EEA 2020 report – noise is increasing

Should railway care about health?

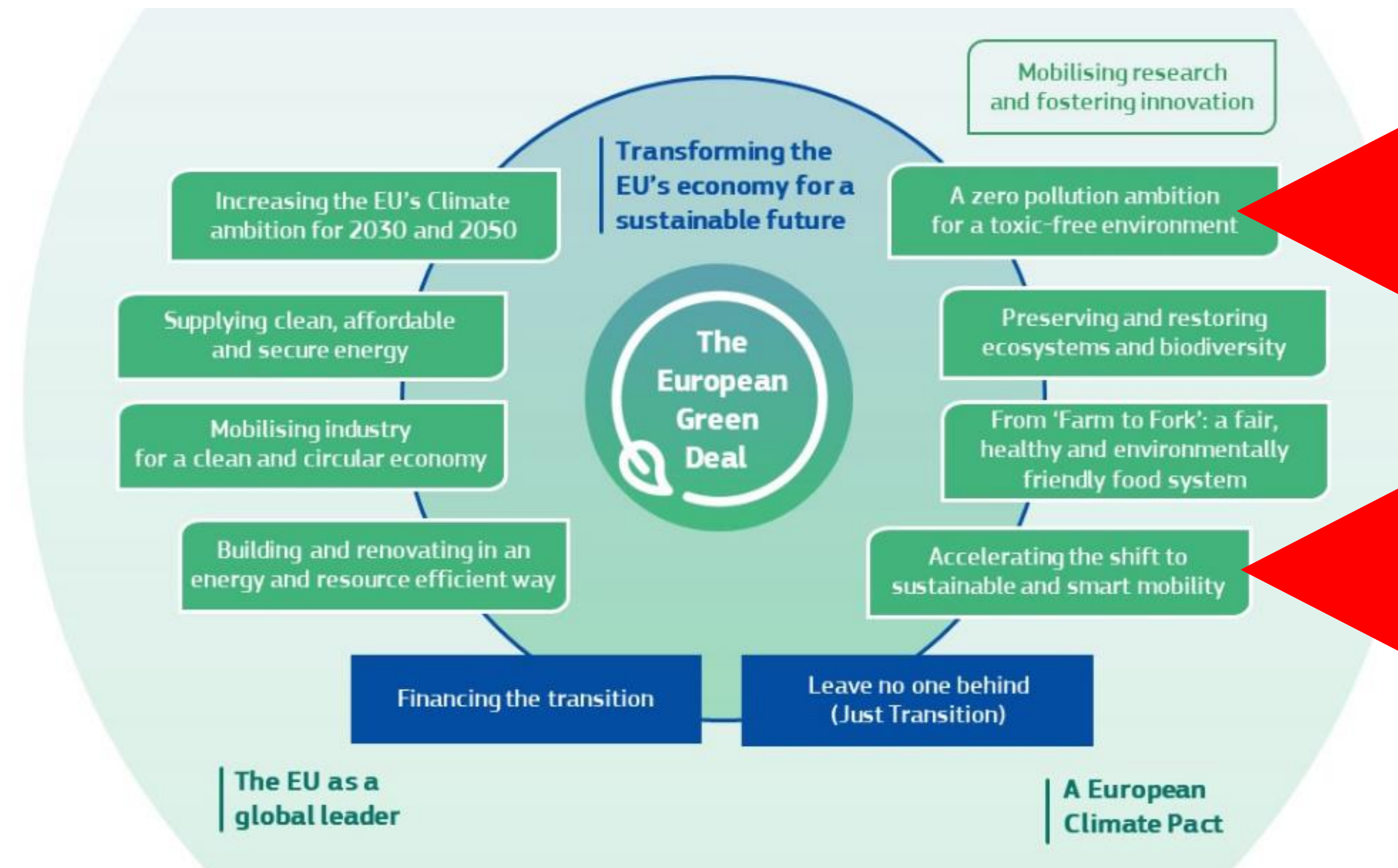
- Health (2000 deaths, 1,8 Mil. people with bad sleep)



- Safety (? out of 1000 deaths)
- Climate change
- Profitability of the sector

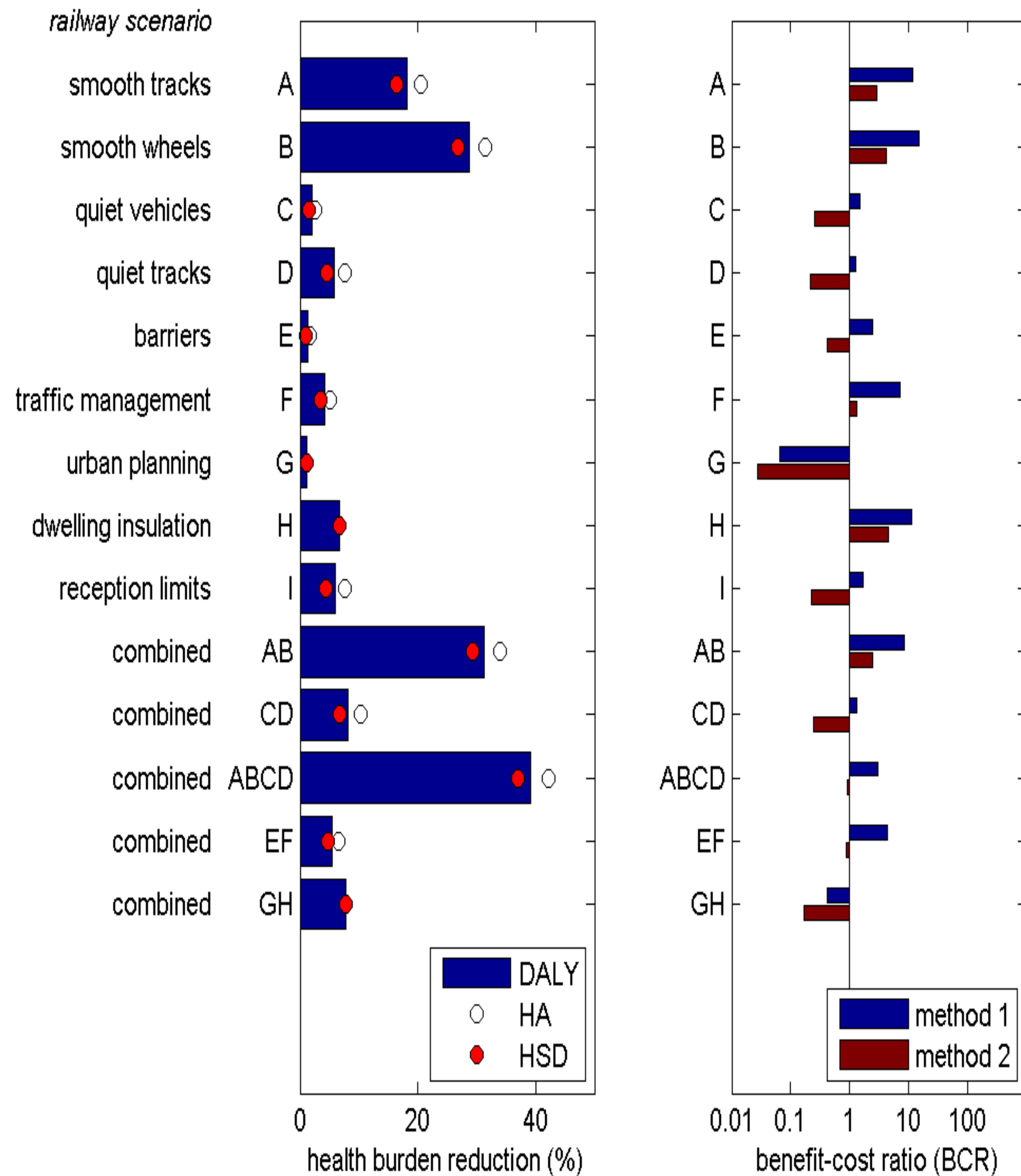
What is the EU doing?

- Treaty
- Green Deal
 - ZPAP
 - SSMS
- European Year of Rail 2021



PHENOMENA – an assessment of noise policy

- Which are the existing solutions?
- Which solutions could be reasonably introduced?
- Which are the most cost-effective ones?
- Are stakeholders and Member States ready to commit to them?
- What reduction on health burden can we achieve in 10 years?
- Is there any law that needs to be revised?



Preliminary results

- Smooth track
- Smooth wheels

Preliminary findings

- **Several noise legislation** at local, regional, national, EU and international have been analysed
- **Objective** of the action plans are sometimes not well defined and might lack targets
- Need to **combine solutions** (local with global)
- Several **cost-effective options**

What the EU could further do?

Possible options still under consideration

- Reflection ongoing on follow up of the PHENOMENA study, including:
 - shall we revise the Environmental Noise Directive?
 - streamline the action plans;
 - introduce targets;
 - link with urban planning;
 - shall we revise the limits at source?
 - shall we add polluter pays principle (charges/taxes)?
 - what use of environmental labelling?



Conclusion

Conclusion

All modes of transport should be treated fairly

Safety is at core

Important to re-balancing the relevance of different externalities

Noise is still to be reduced

Relevant legislation to be amended, as appropriate!

Thank you

marco.paviotti@ec.europa.eu



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Ethem PEKIN

**Community of European Railway and Infrastructure Companies (CER)
Head of Economic Policy and Sustainability**

Towards quieter railways

Ethem Pekin, Head of Economic Policy and Sustainability

UIC Railway noise days

23 February 2021



Noise remains a challenge

- Noise is the **2nd largest** health problem in Europe
- **120 million** Europeans are being affected by noise
- Noise also impacts nature and wildlife

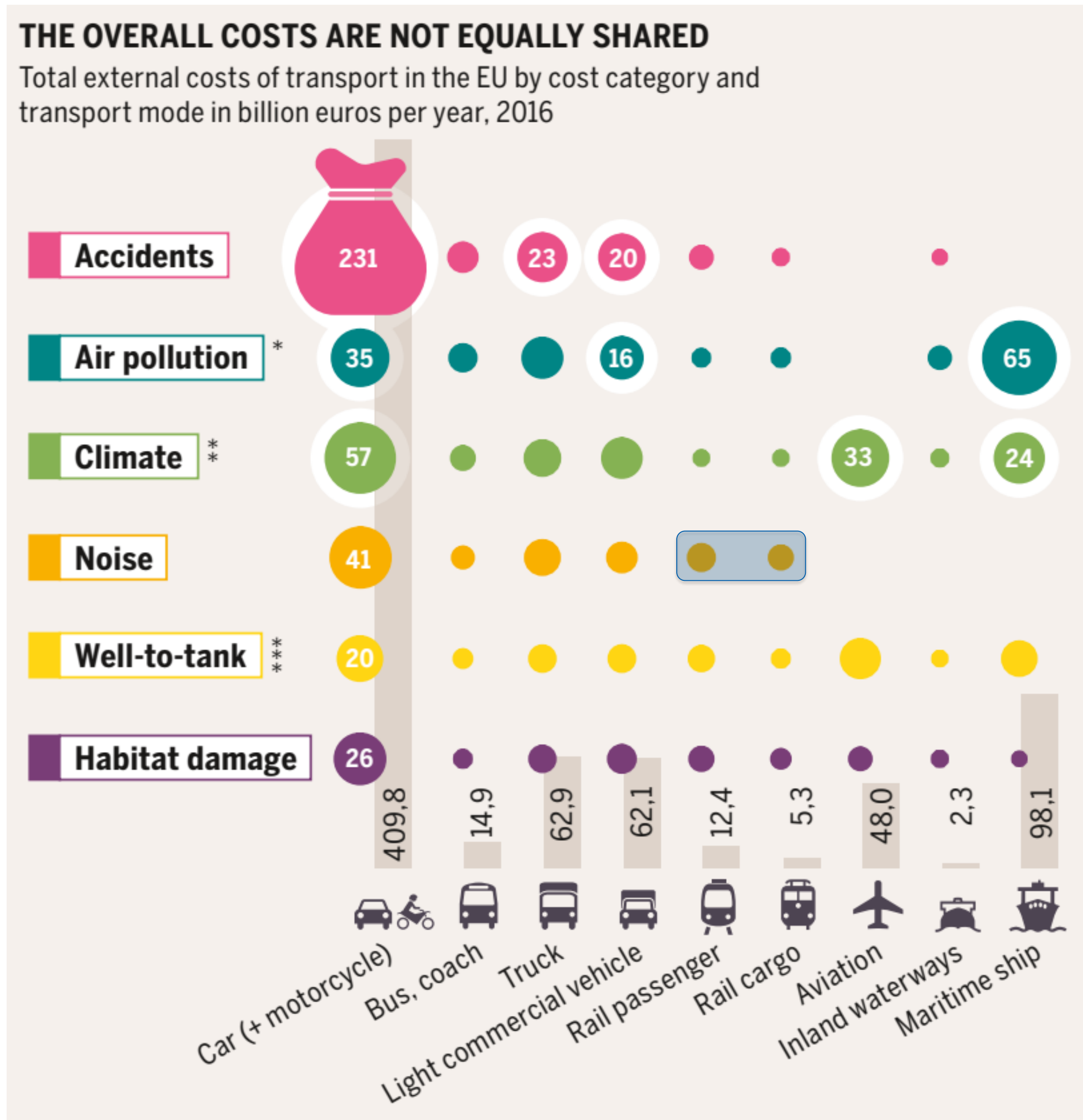
- Steady urbanisation – **84% of population** by 2050
- Battery electric vehicles – good & bad for noise
- Aviation traffic is projected to grow – COVID19 Baseline



“

*The climate neutrality objective of the EU Green Deal requires a **modal shift** to rail being the greenest transport mode. This requires rail to be more **competitive** and **attractive** for the customers and for the society. To meet this challenge European railways must become **more silent** – and they work heavily on it.*

Getting the prices right



- Rail's externalities are low; but noise needs to be tackled
- TSI Noise & retrofitting are promising initiatives
- The big picture is needed to internalise noise costs
- +12% citizens exposed to air traffic noise compared to 2005
- At the same level of exposure aviation noise more annoying than rail and road

Rail is becoming quieter already NOW

- Electric passenger trains running on well-maintained track are relatively quiet
- Older freight wagons equipped with cast iron brake blocks cause significant noise (at night time)
- TSI Noise – quieter routes in 3 years time
- Retrofitting, unlike road fleet renewal, reduces noise
- The Nordic winter conditions; safety is no compromise
- Gradual phasing out of diesel propulsion

Sector has done its fair share by retrofitting


- More than half of EU's wagon fleet is already quiet
207,000 wagons were retrofitted; **200,000** to go
- EU co-funding & national subsidies were limited
- Limited availability of noise-differentiated track access charges (NDTACs)
- Sector continues to pay for **higher operating costs**
- Noise performance of composite brake blocks
- Noise from parked trains

Retrofitting was/is an economic topic

- Technology is here; goals are set but financial incentives are required to complete retrofitting
- Goods news: we have many **innovative funding tools**
 - NDTACs
 - CEF budget
 - State aid guidelines
 - Recovery and Resilience Facility
 - EU Taxonomy
 - Road pricing (Eurovignette)
 - Revenues from the EU Emissions Trading System

Proposals for a cost-competitive quieter rail freight

- 2021-2024
 - Continue with NDTACs
 - CEF call with higher co-funding rate
 - State aids to support first movers
- 2024-2030
 - Make use of the Recovery and Resilience Facility
 - Implement polluter-pays principle for all modes
 - ETS revenues to provide general support to rail
- 2030-2050
 - Make use of private funding – EU Taxonomy
 - Thanks to modal shift, higher revenues for further noise mitigation
 - More freight flows but less noise for European citizens



€100 mio

Annual budget for
noise reduction
2021-2024

For further information:

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For regular updates on CER activities,
visit our website: **www.cer.be**
or follow  **@CER_railways**



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Questions & Answers



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10:30 - 11:00 Coffee break



Networking rooms @ 10:40 -10:55

You can comment and interact with other participants live.

www.uic.org



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#Noise days #Sustainability #Rail system



Breakout Rooms



- ▼ UIC Sustainability
- ▼ UIC Noise Working Group - T.Aasen
- ▼ UIC Vibration W.G. - Alf Ekblad
- ▼ UIC LOWNOISEPAD project -W. Verhelst
- ▼ Impact of USPs on noise - B.Asmussen
- ▼ European Com DG ENV - Marco Paviotti
- ▼ European Env. Agency -Eulalia Peris
- ▼ CER - Ethem Pekin
- ▼ European Com DG MOVE - Nino Zambara



Breakout Rooms

11:00 European Environment Agency, Environmental noise in Europe 2020 report

Eulalia PERIS, EEA

11:20 Railway Noise is Europe State-of-the-art report - 2021

Pinar YILMAZER, Senior Advisor of UIC Noise and Vibration Sector

Wout SCHWANEN, M + P Raadgevende Ingenieurs BV

11:40 UIC Train Track Interaction Acoustic White Paper

Pierre Etienne GAUTIER, SNCF Réseau

11:50 Q&A + Concluding remarks



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Eulalia Peris

**European Environment Agency
Environmental noise expert**

Environmental noise in Europe - 2020

Eulalia Peris

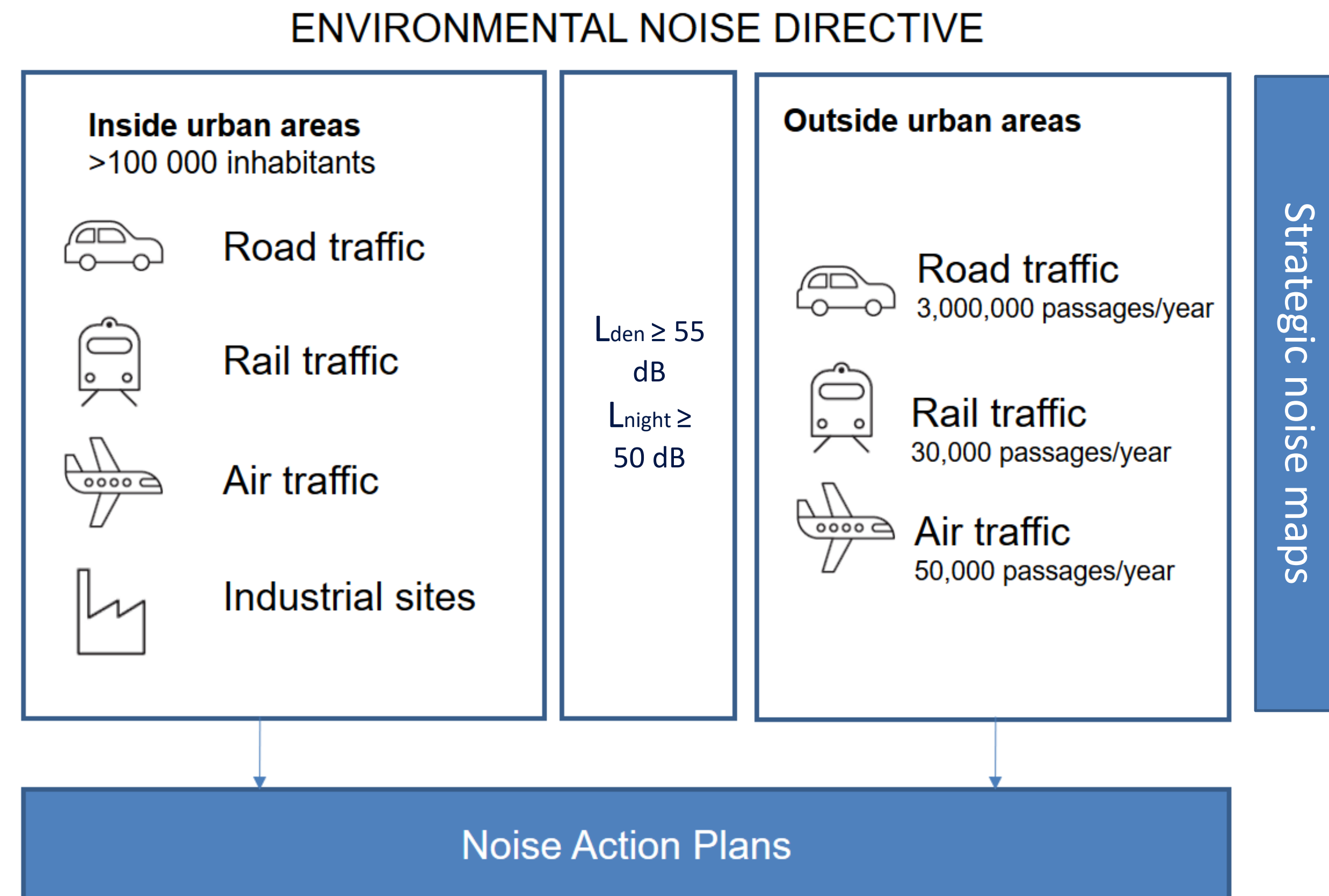
EEA Environmental Noise Expert

Eulalia.Peris@eea.europa.eu



Context

- Environmental Noise Directive (END) → avoiding and preventing exposure to environmental noise through reporting of noise mapping and action planning.



Context

- 7th Environmental Action Programme to 2020 → By 2020 noise pollution in the EU needs to be significantly decreased, moving closer to the WHO recommended levels.



Reducing noise below these levels is recommended (WHO, 2018).

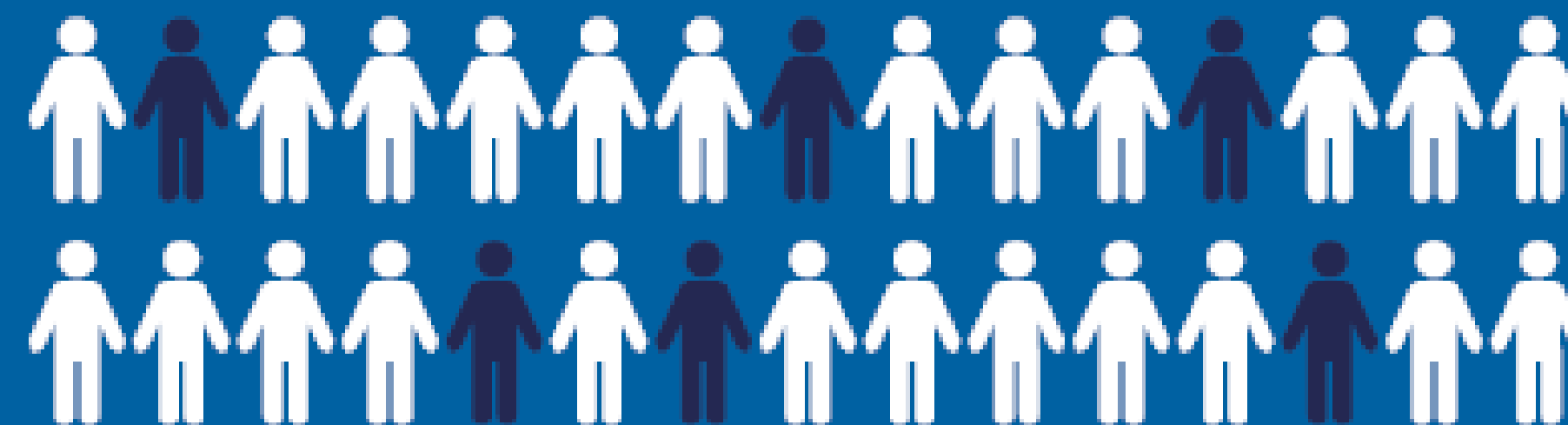
	Road	Rail	Aircraft
L_{den}	53 dB	54 dB	45 dB
L_{night}	45 dB	44 dB	40 dB

Key findings of the report

Population exposed to noise

- Environmental noise, and in particular road traffic noise, is a major environmental problem in Europe.

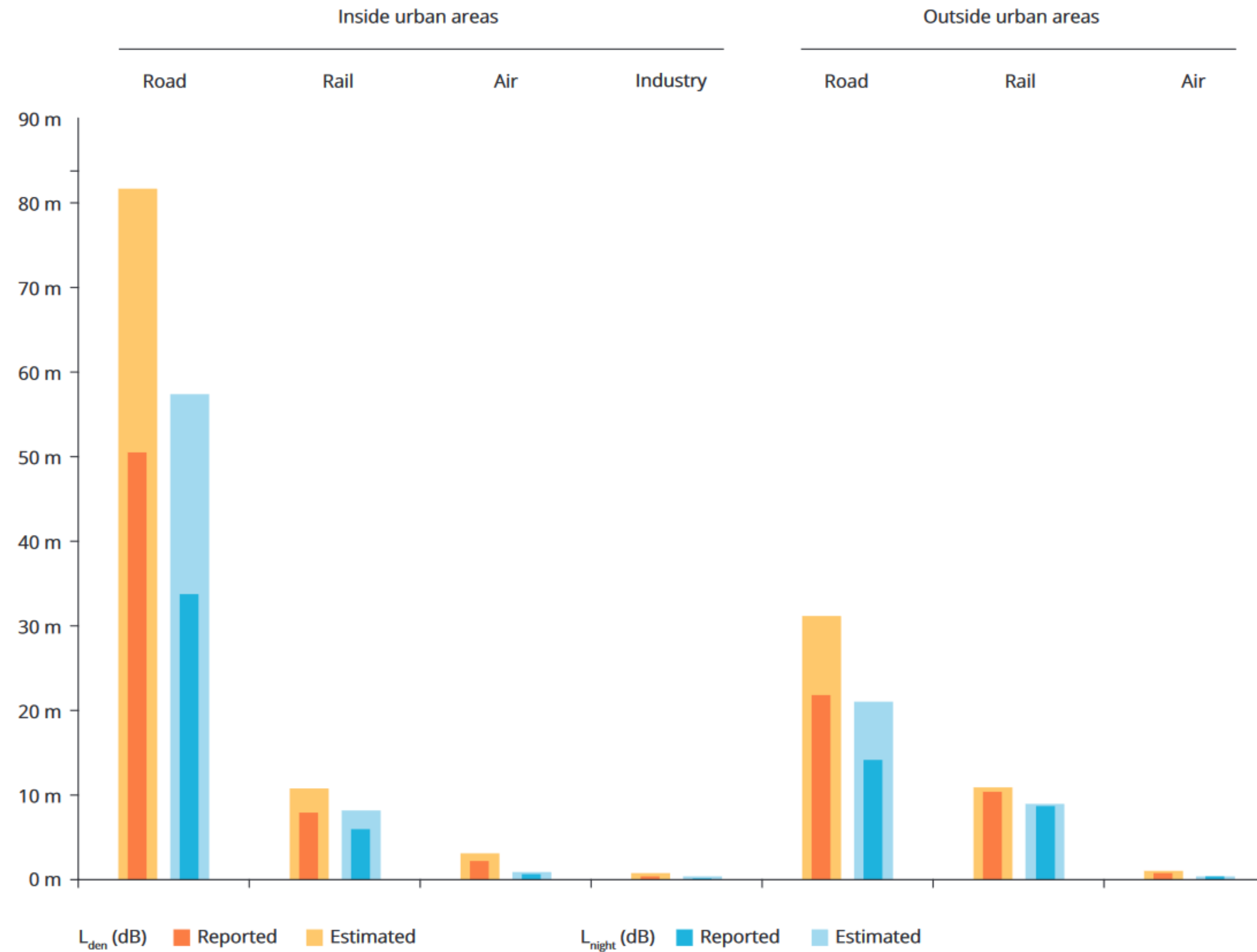
20% of the EU population — one in five people — live in areas where noise levels are considered harmful to health.



Urban areas, which have the highest number of people exposed to harmful levels of noise, are the most affected.

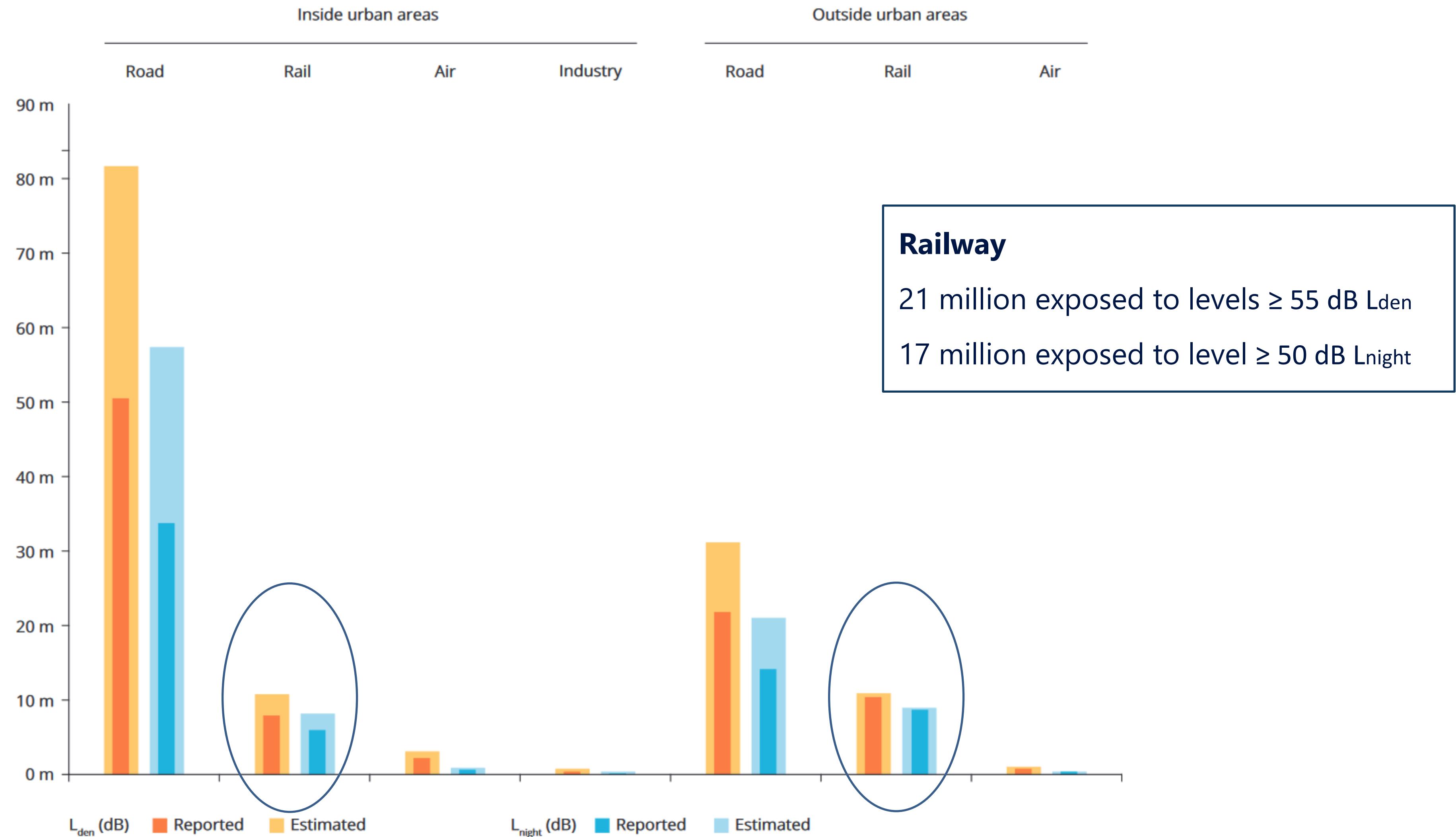
Population exposed to noise

Number of people exposed to $L_{den} \geq 55$ dB and $L_{night} \geq 50$ dB (millions) (EU+ UK+ Switzerland+ Norway+ Iceland + Liechtenstein)



Population exposed to noise

Number of people exposed to $L_{den} \geq 55$ dB and $L_{night} \geq 50$ dB (millions) (EU+ UK+ Switzerland+ Norway+ Iceland + Liechtenstein)

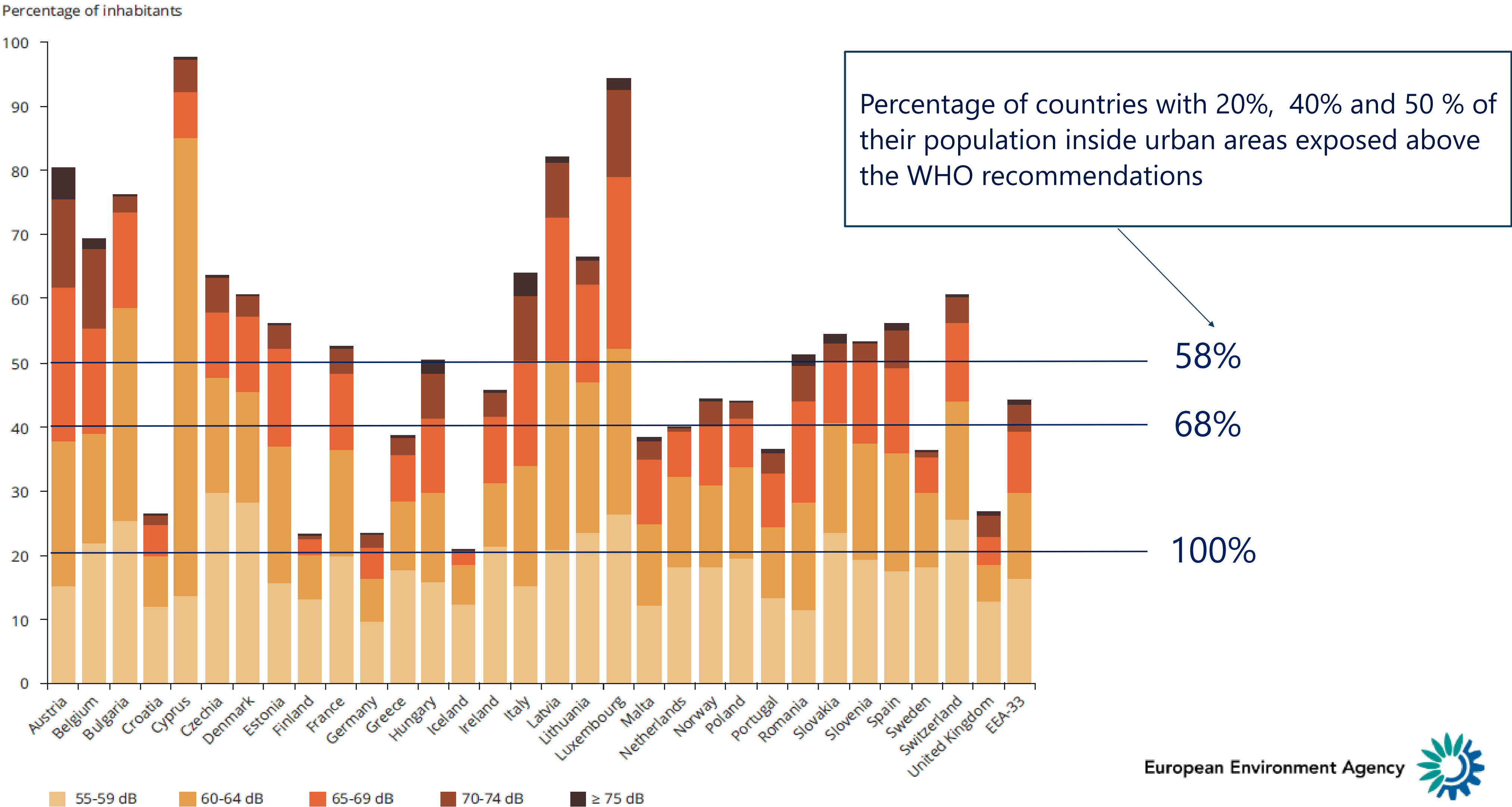


Road traffic noise inside urban areas

- In most European countries, a large number of inhabitants within urban areas are exposed to road noise levels of 55 dB or higher during the day-evening-night period.

Road traffic noise inside urban areas

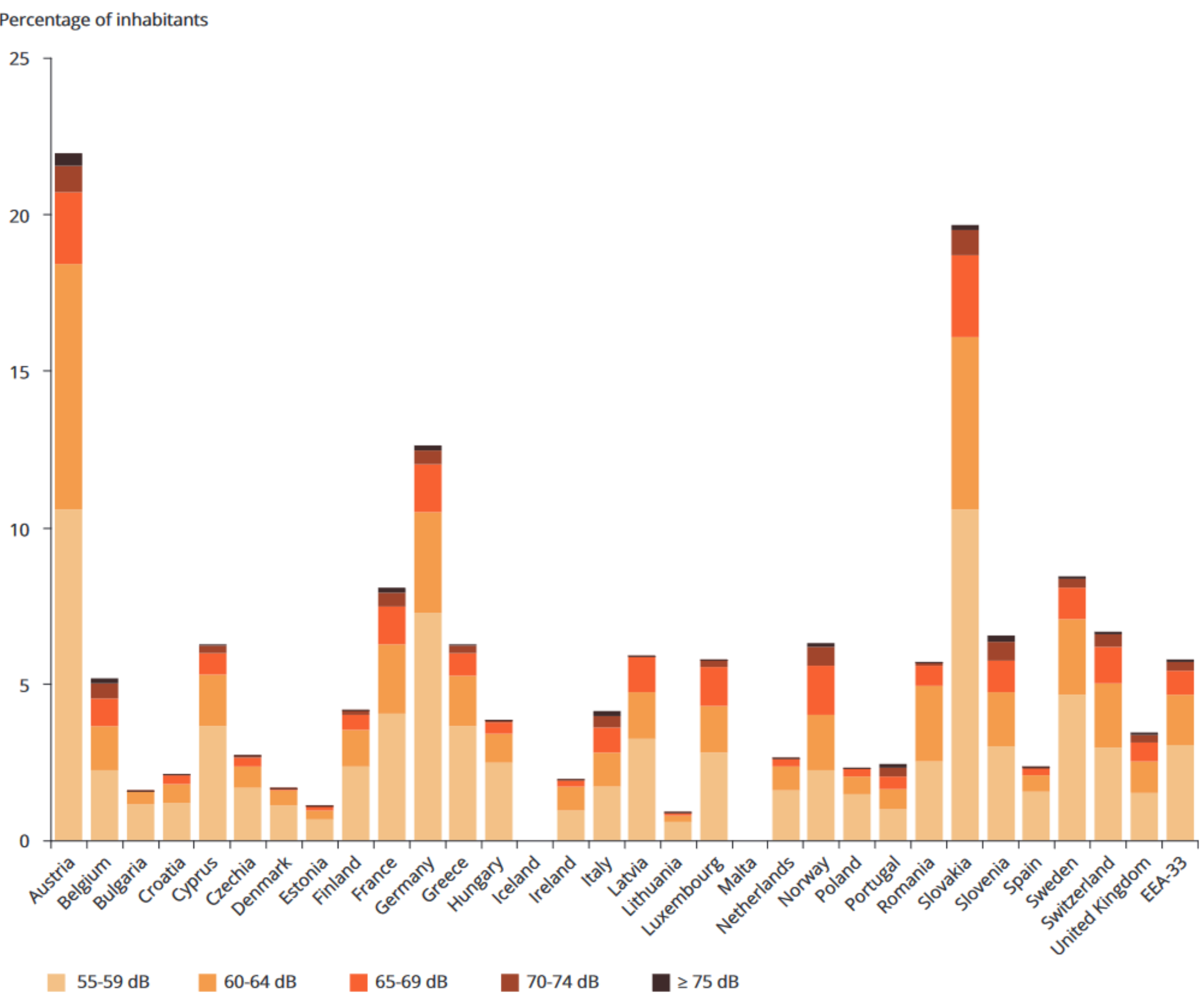
Figure 2.8 Estimated percentage of inhabitants within urban areas exposed to road traffic noise bands in 2017, using the L_{den} indicator



Rail and air traffic noise inside urban areas

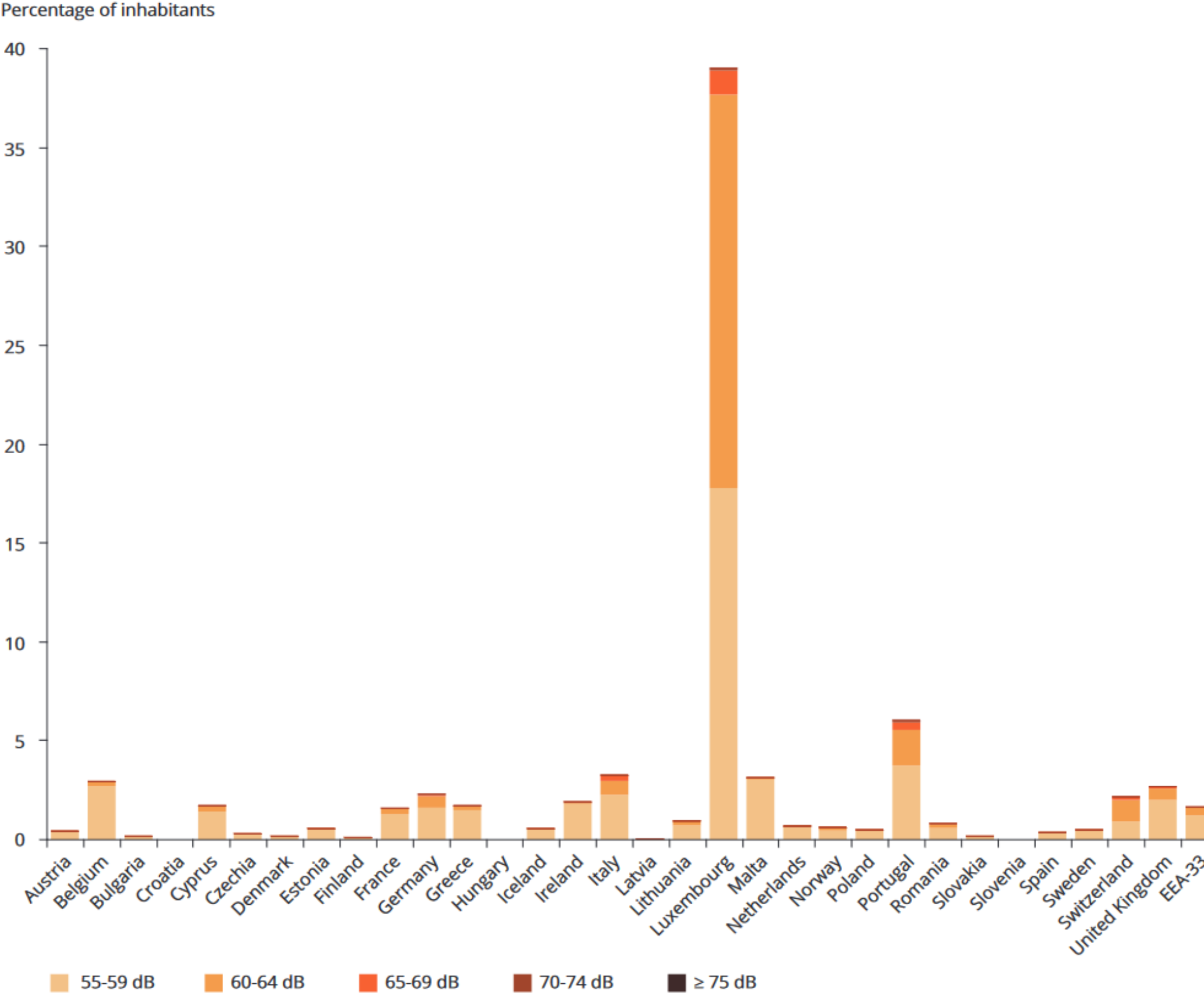
Rail traffic

Figure 2.10 Estimated percentage of inhabitants within urban areas exposed to rail traffic noise bands in 2017, using the L_{den} indicator



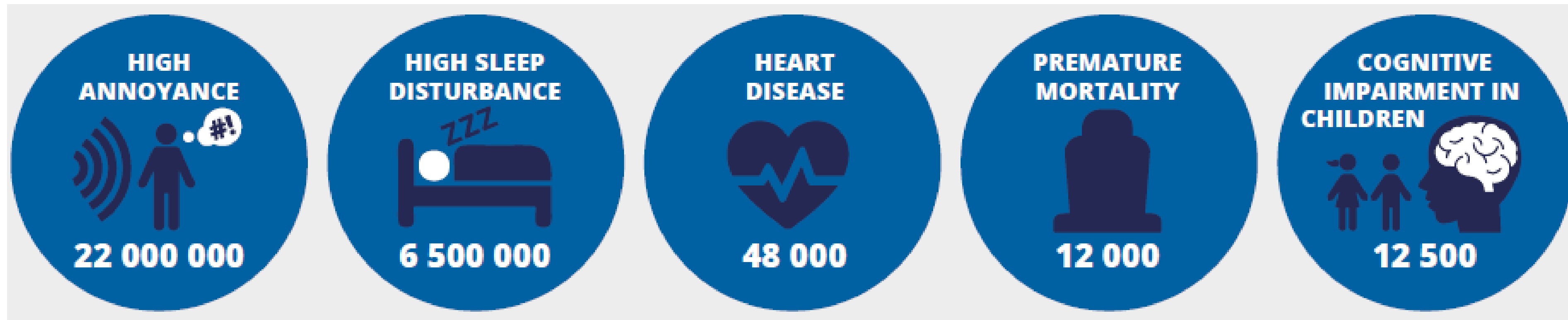
Air traffic

Figure 2.12 Estimated percentage of inhabitants within agglomerations exposed to air traffic noise bands in 2017, using the L_{den} indicator



Health impacts of noise

- Environmental noise affects millions of people causing significant public health impacts.

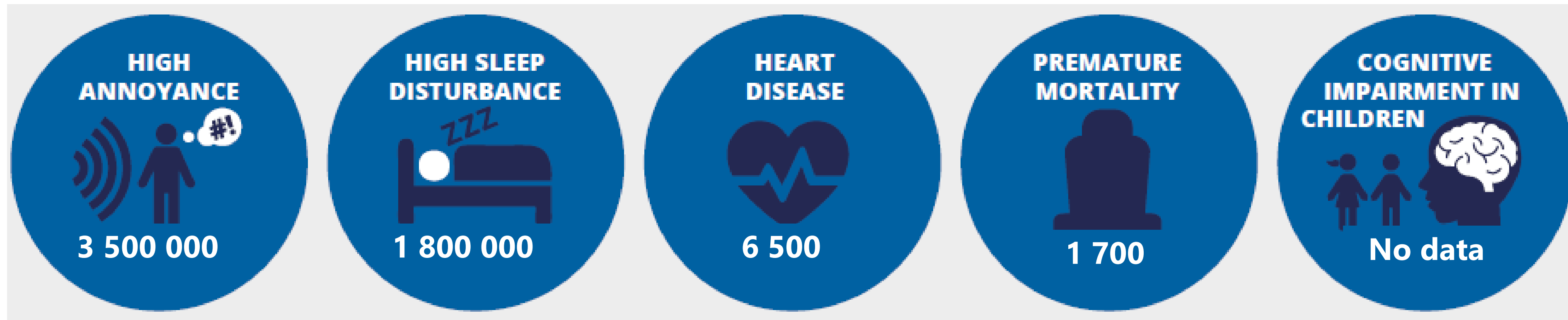


The major part of the burden of disease occurs inside urban areas with road traffic noise being the largest contributor.

*Assessed at levels starting at 55 dB L_{den} and 50 dB L_{night} for sources of noise reported under the END

Health impacts of noise

- Estimated health impacts for railway noise

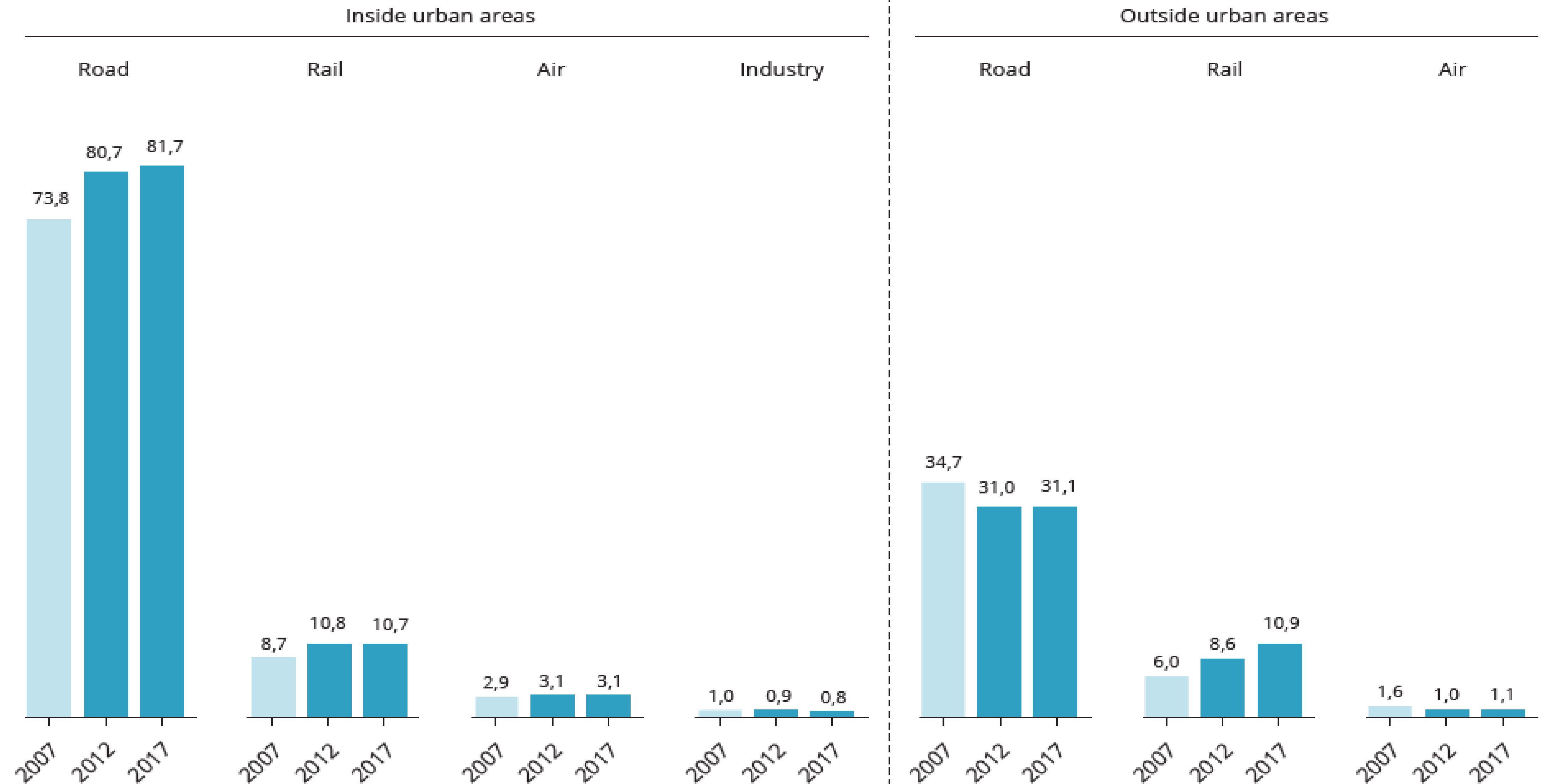


Rail traffic is especially relevant at night and affects urban and non-urban areas equally.

*Assessed at levels starting at 55 dB L_{den} and 50 dB L_{night} for sources of noise reported under the END

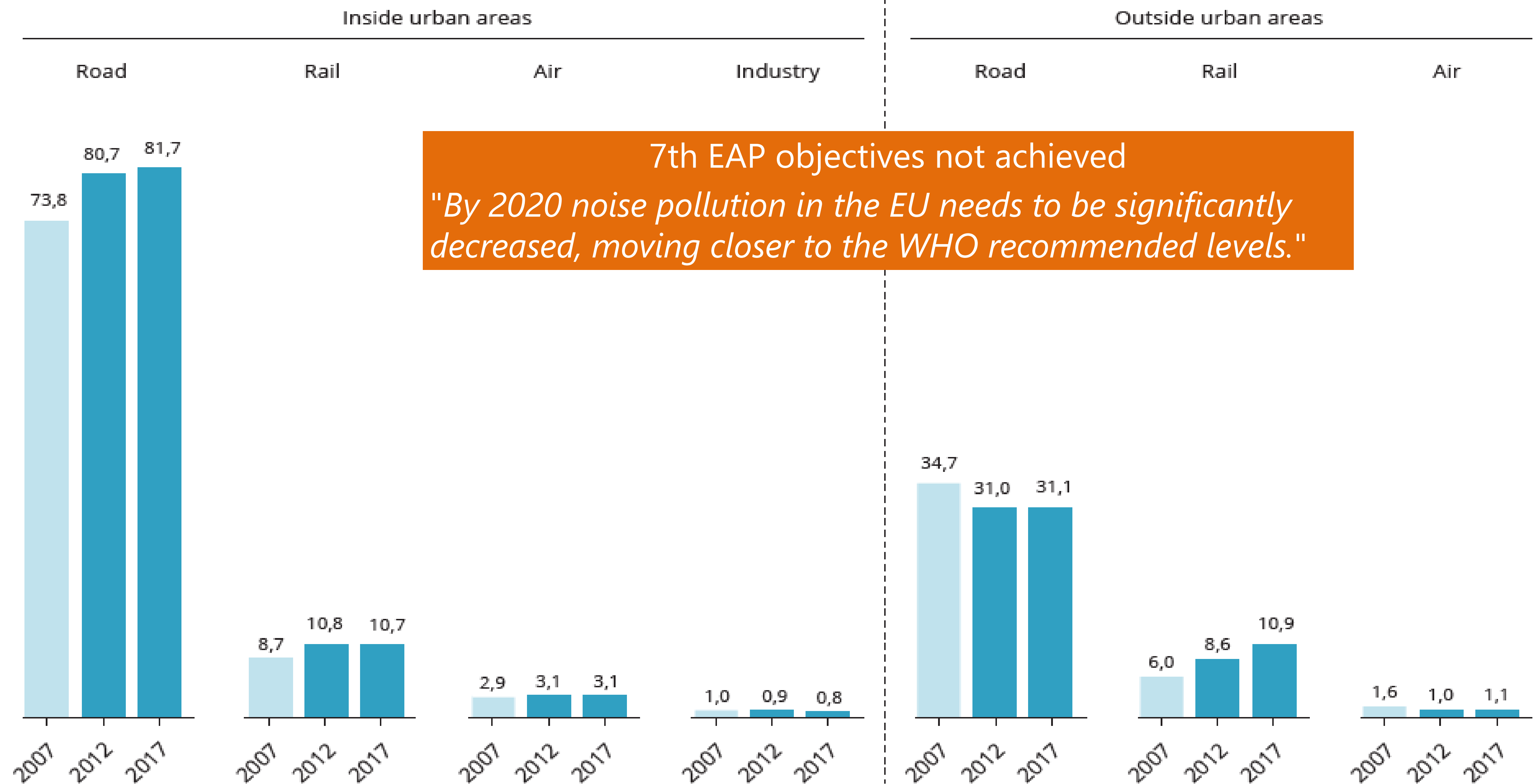
7th EAP objectives

Number of people exposed to $L_{den} \geq 55$ dB (Millions)



7th EAP objectives

Number of people exposed to $L_{den} \geq 55$ dB (Millions)



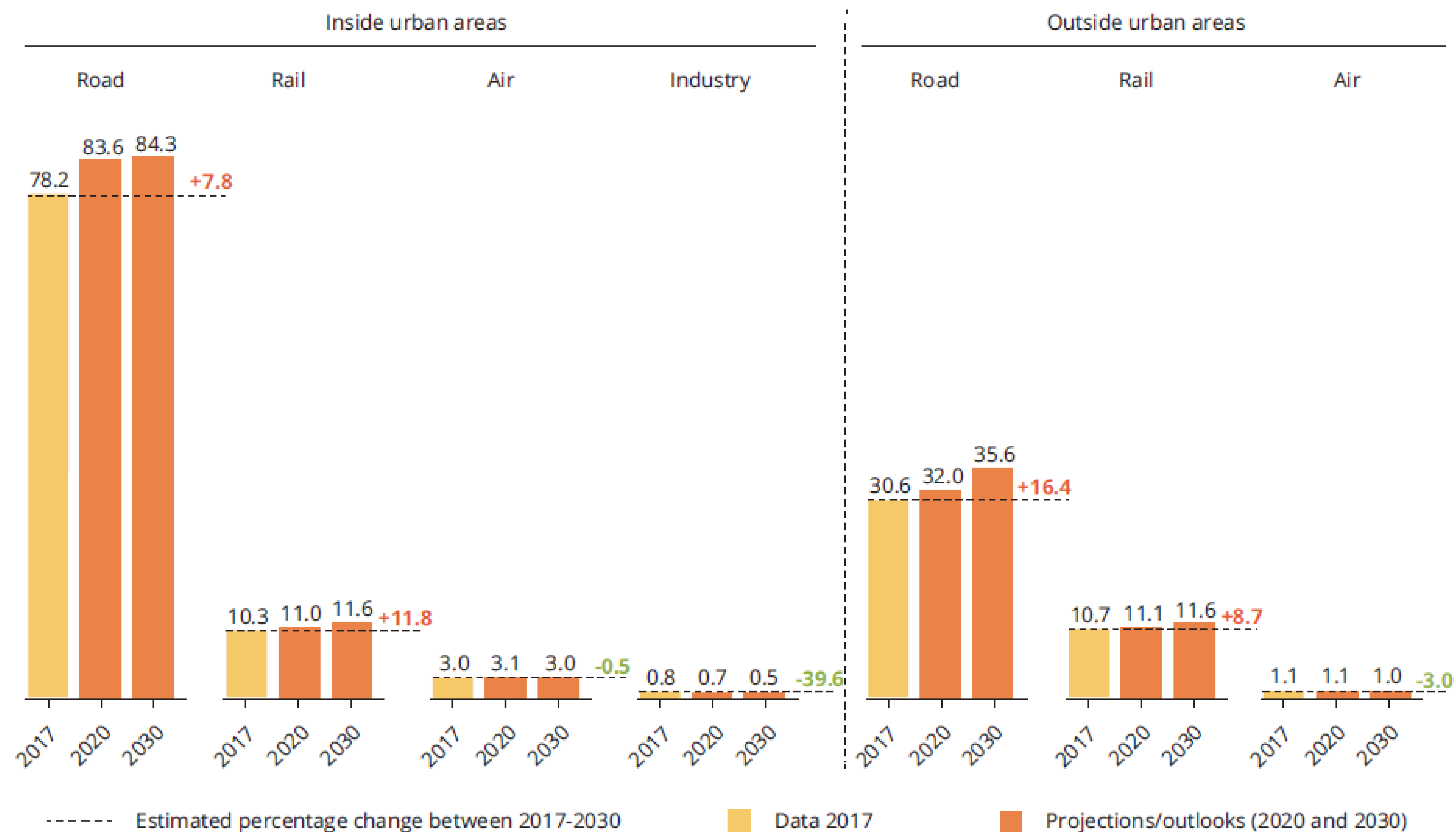
Projections

- The number of people exposed to high levels of noise remains high and is likely to increase.

Projections

Figure 2.18 Outlooks for 2020 and 2030 in areas covered by the END for the day-evening-night period, EU-28

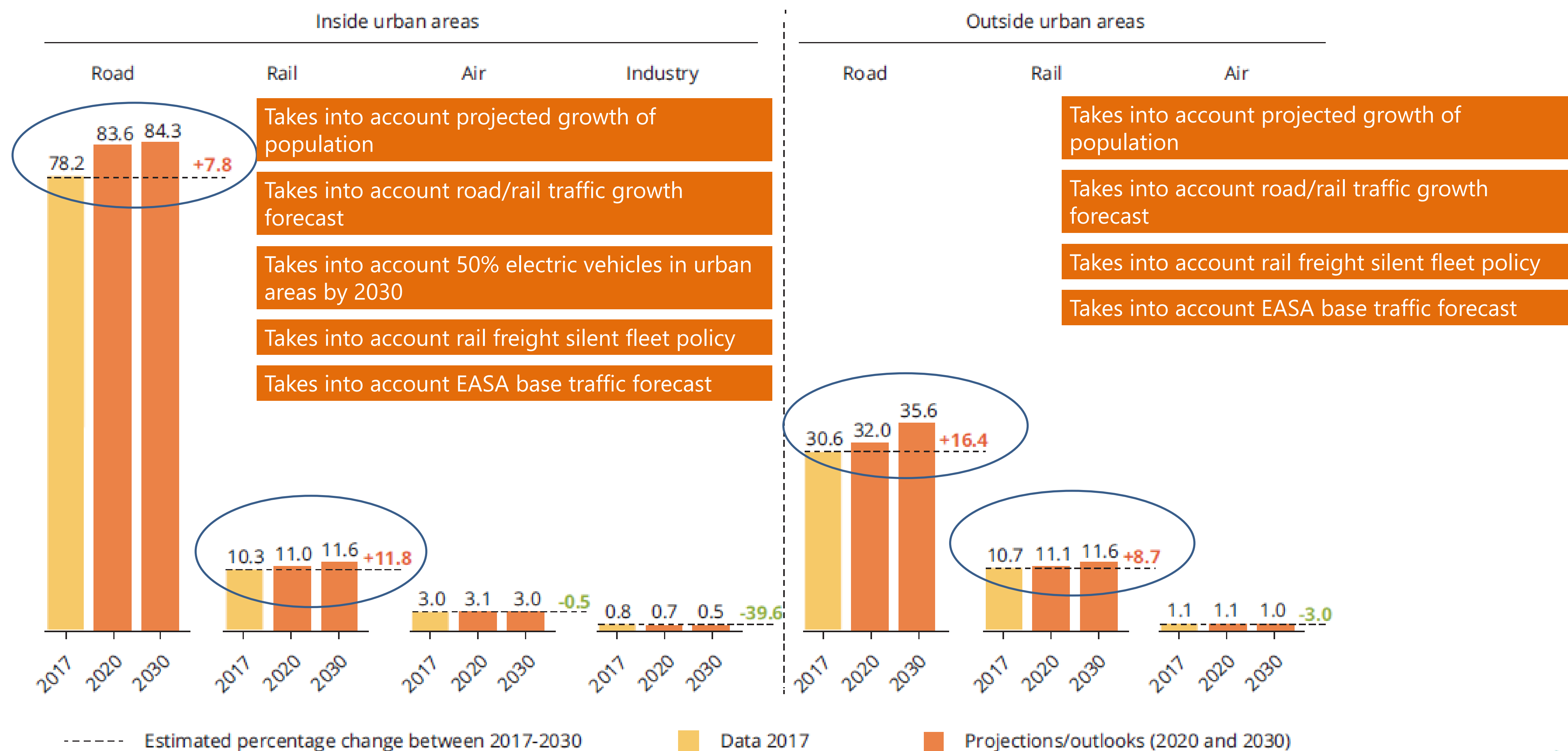
Number of people exposed to $L_{den} \geq 55$ dB (millions) and estimated percentage change between 2017-2030



Projections

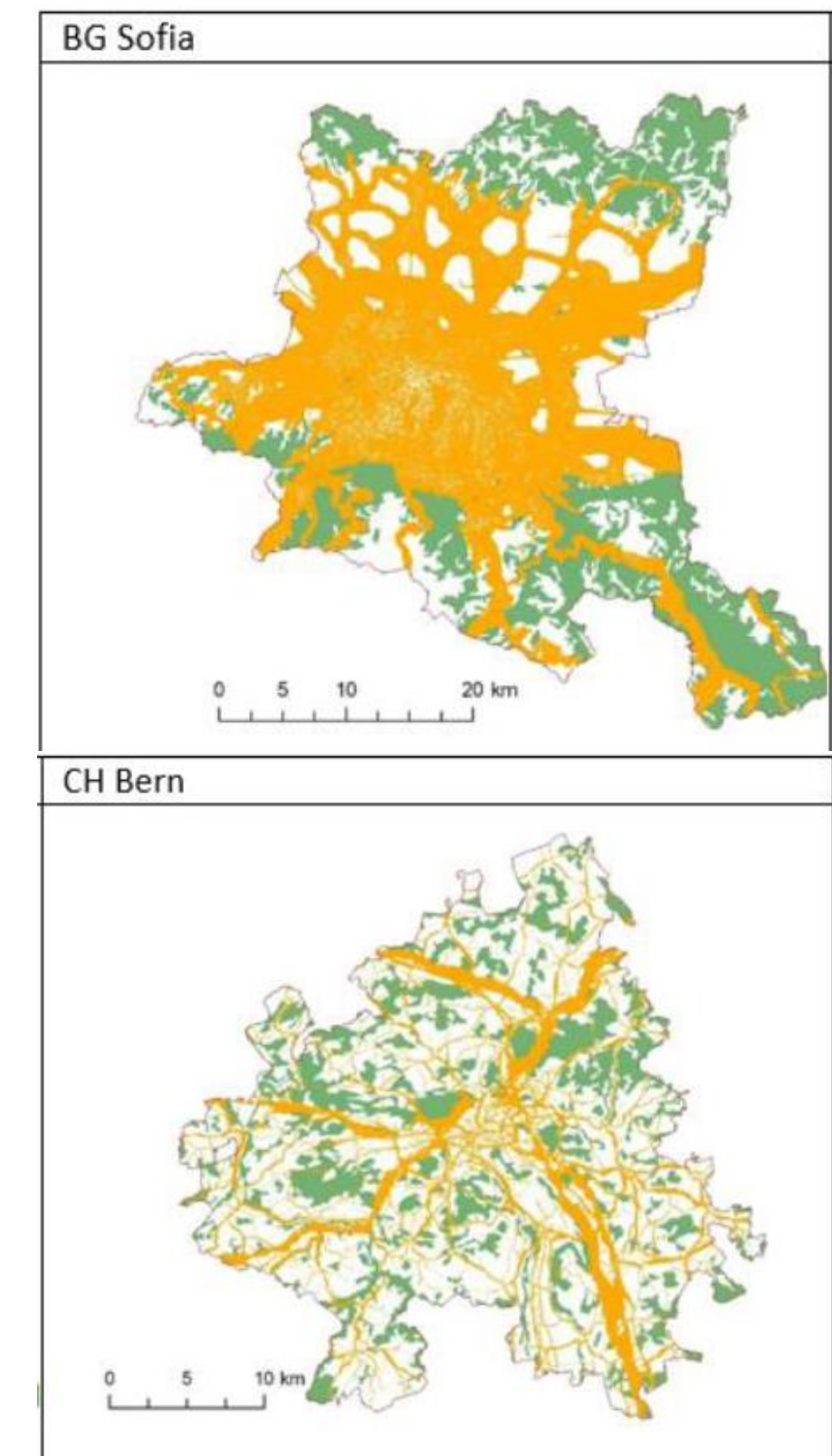
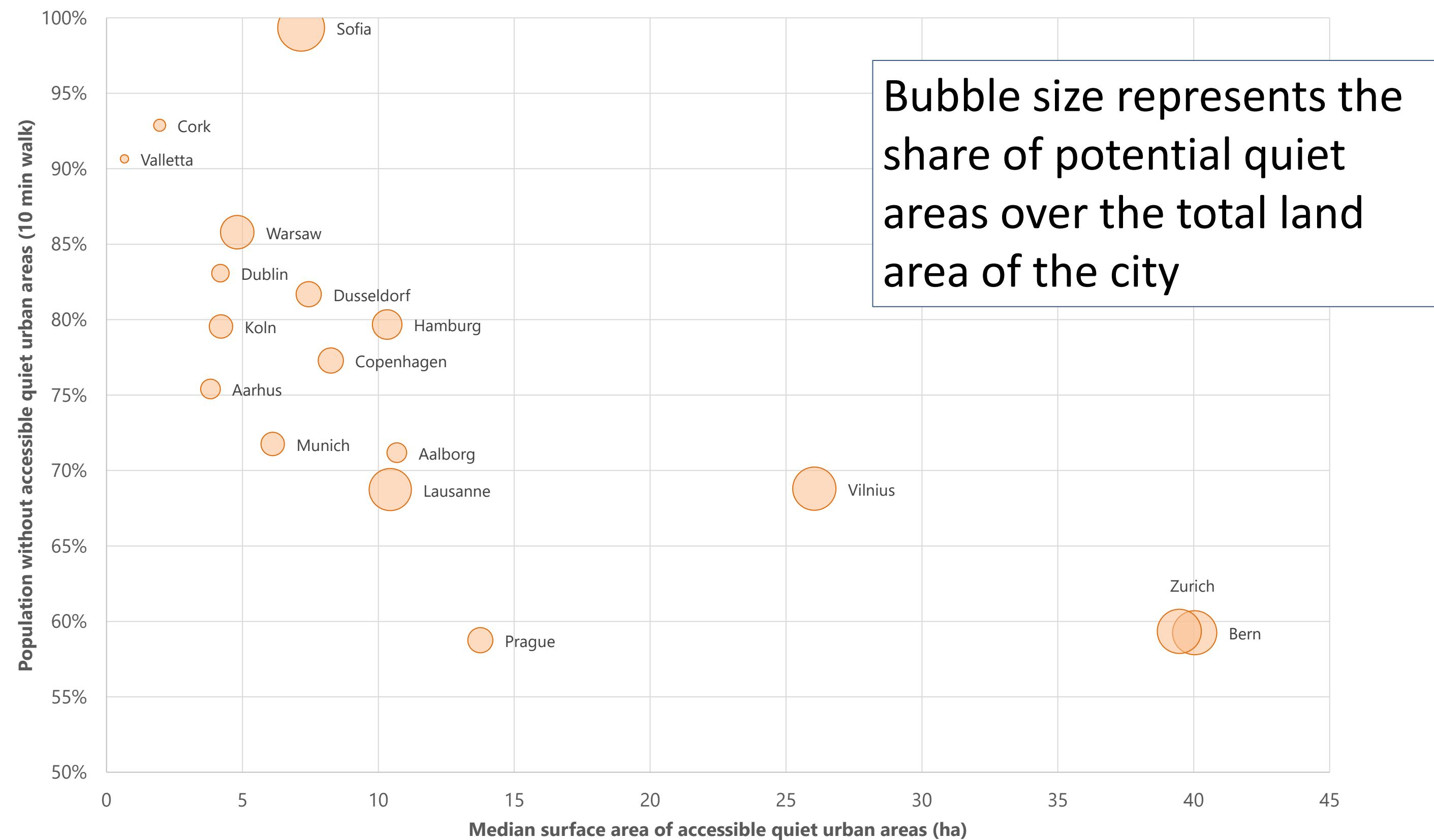
Figure 2.18 Outlooks for 2020 and 2030 in areas covered by the END for the day-evening-night period, EU-28

Number of people exposed to $L_{den} \geq 55$ dB (millions) and estimated percentage change between 2017-2030



Quiet Areas

- More needs to be done to protect and improve accessibility to quiet areas in cities.



Reducing and managing noise exposure

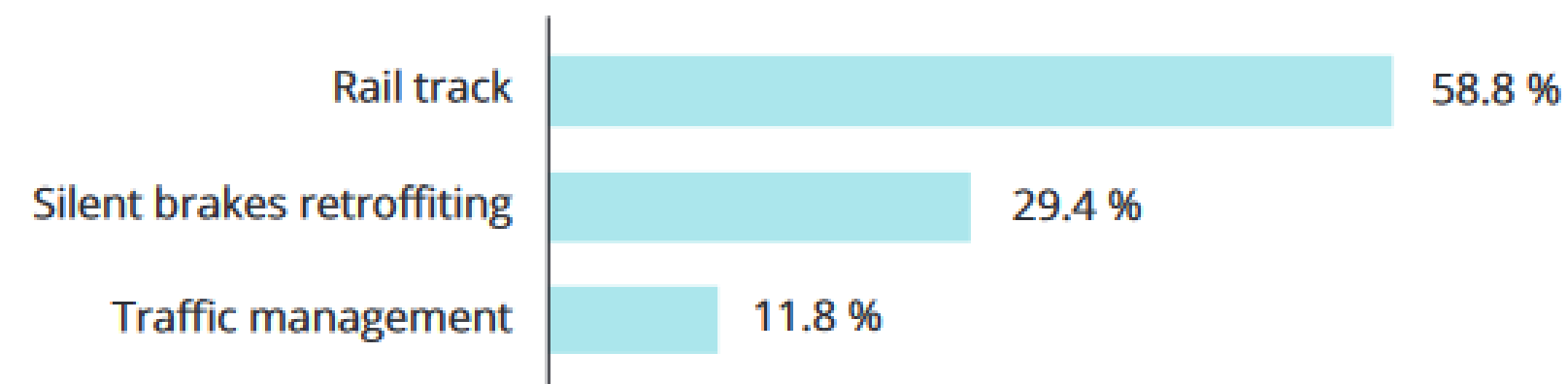
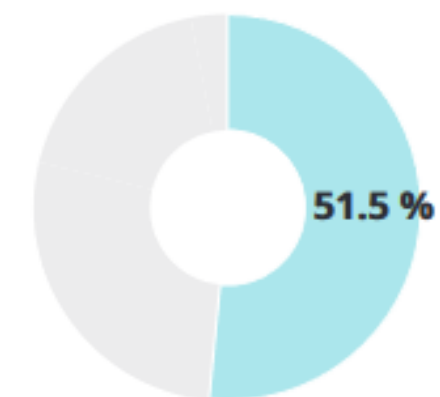
- Competent authorities for roads, railways, airports and cities are undertaking a variety of actions to reduce and manage environmental noise. It is difficult to track implementation of the action plans and their benefits in terms of positive health outcomes.

	Major Roads	Major Railways	Major Airports	Agglomerations
Measures at the path	40,4%	27,7%	13,5%	16,5%
Measures at the source	38,5%	51,5%	70,2%	51,2%
Urban planning and infrastructure change	13,5%	18,2%	7,7%	9,9%
Education and communication	5,8%	0,0%	8,7%	15,1%
Other physical measures	1,9%	3,0%	0,0%	7,3%

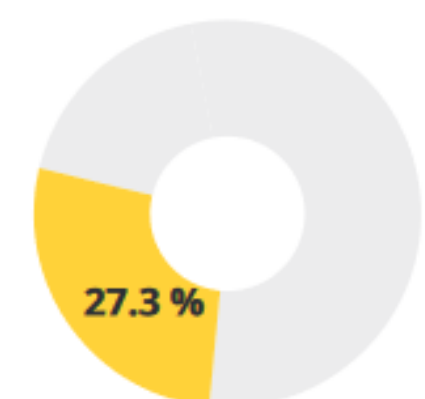
Reducing and managing noise exposure - railway

- Measures at source are extensively used to reduce and manage railway noise. Other measures such as urban and land use planning represent a small percentage of the measures chosen to address noise.

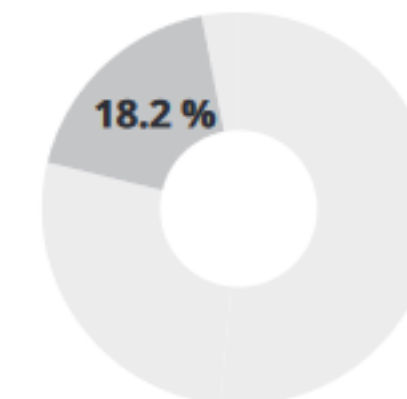
Measures at the source



Measures at the path



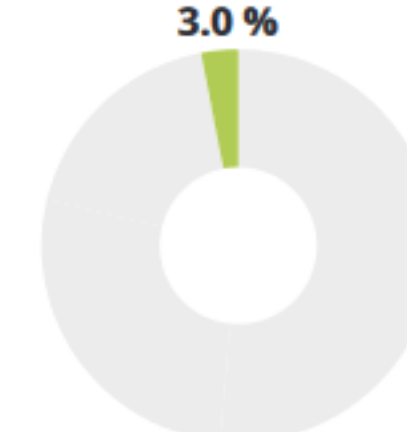
Urban planning and infrastructure change



Land use planning and design



Other physical measures



Availability of quiet areas



Reducing and managing noise exposure

WHO (2018)

7th EAP

Recommendations	Results from END action plans
Quiet Areas	Needs improvement
Health outcomes	Needs improvement
Inform and involve communities	Needs improvement
Road noise – mitigation at source and on the noise path by making changes to the infrastructure	Partially on track
Aircraft noise – mitigation by infrastructure changes	On track
Mitigation at source	On track
Mitigation by urban planning and city design	Needs improvement



Thank you!

More information:

- Environmental noise in Europe report:

<https://www.eea.europa.eu/publications/environmental-noise-in-europe>

- Noise viewer:

<http://noise.eea.europa.eu/>

- Noise country fact sheets:

<https://www.eea.europa.eu/themes/human/noise/noise-fact-sheets>

- Noise data:

<https://www.eea.europa.eu/data-and-maps/data/data-on-noise-exposure-7>

Railway Noise in Europe

86

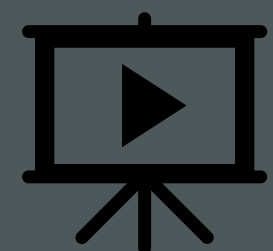


Pinar Yilmazer

UIC Sustainability Unit
Senior advisor of UIC Noise and Vibration Sector

Wout Schwanen

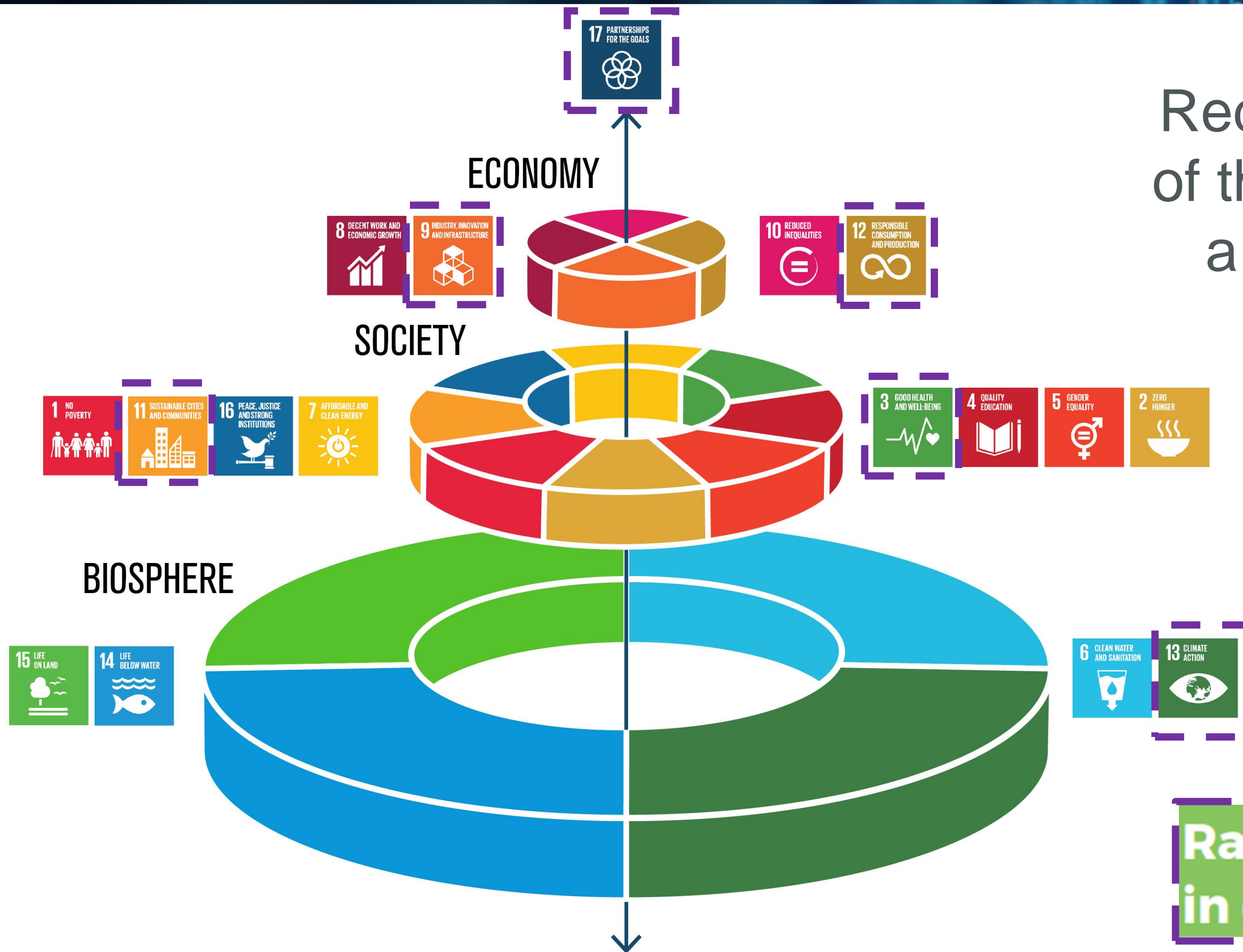
M+P Raadgevende Ingenieurs BV
Senior consultant



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YouTube Channel

United Nations (UN) Sustainable Development Goals (SDGs)

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Reducing the environmental externalities of the railways through noise mitigation is a specific target under the UN SDGs.



**Railway has a central role to play
in decarbonising transport**

Contribution of Railways

17 PARTNERSHIPS
FOR THE GOALS



3 GOOD HEALTH
AND WELL-BEING



13 CLIMATE
ACTION



9 INNOVATION AND
INFRASTRUCTURE



12 RESPONSIBLE
CONSUMPTION



11 SUSTAINABLE CITIES
AND COMMUNITIES



UIC achieve targets by

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**Convening
technical
experts and
leading projects**



**Transfer of
knowledge**



**Promotion of
best practice**



**Comparisons
and benchmarks**



**Dissemination
and
communication
activities**



**Facilitates
communication
with key
stakeholders**



**Close
cooperation with
other railway
organisations**



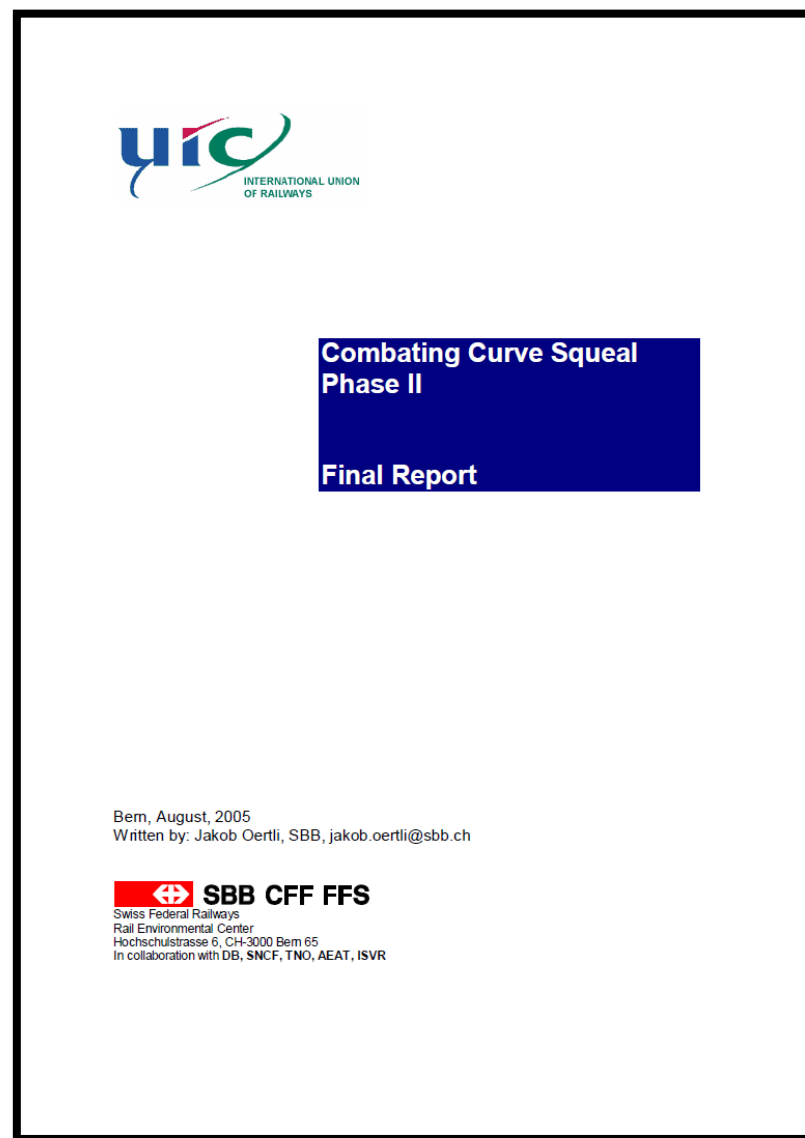
**Attendance at
international
workshops and
conferences**



**UIC international
workshops**

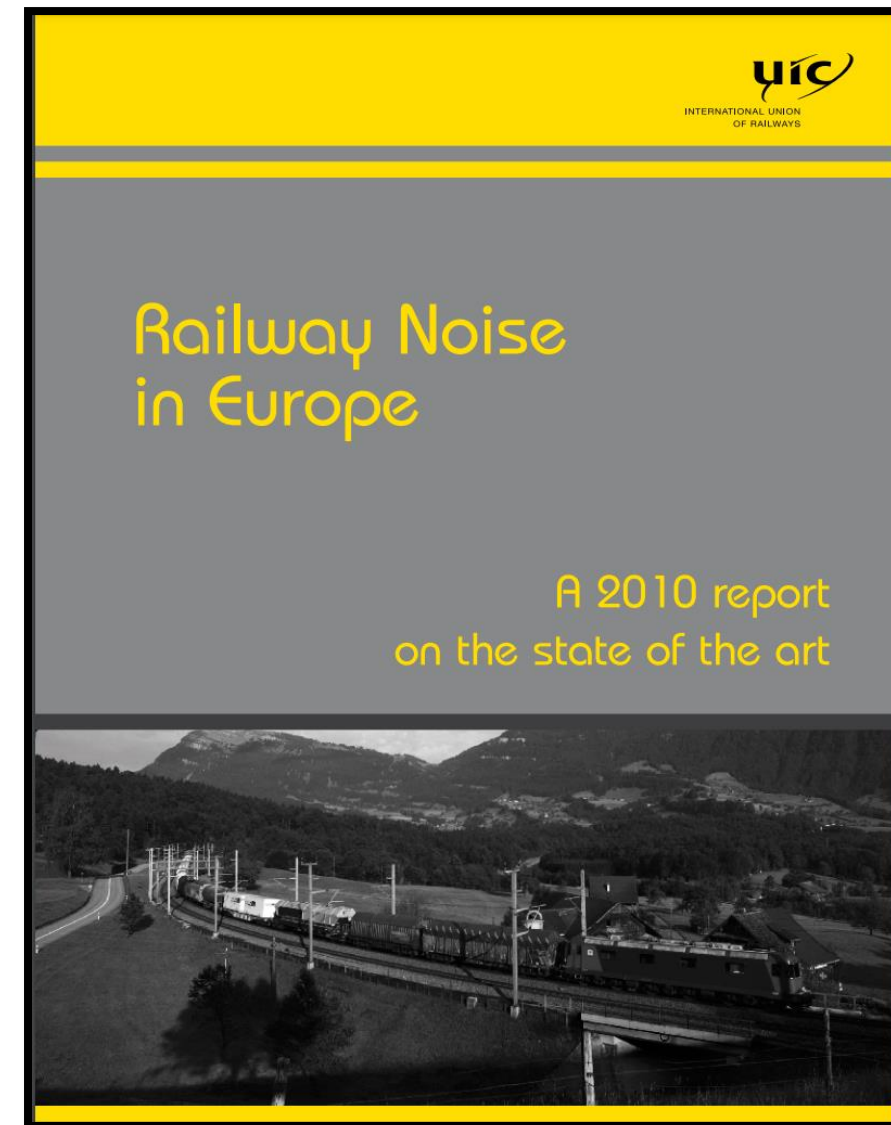
UIC Railway Noise in Europe

90



2007

UIC report
on curve
squeal



2010

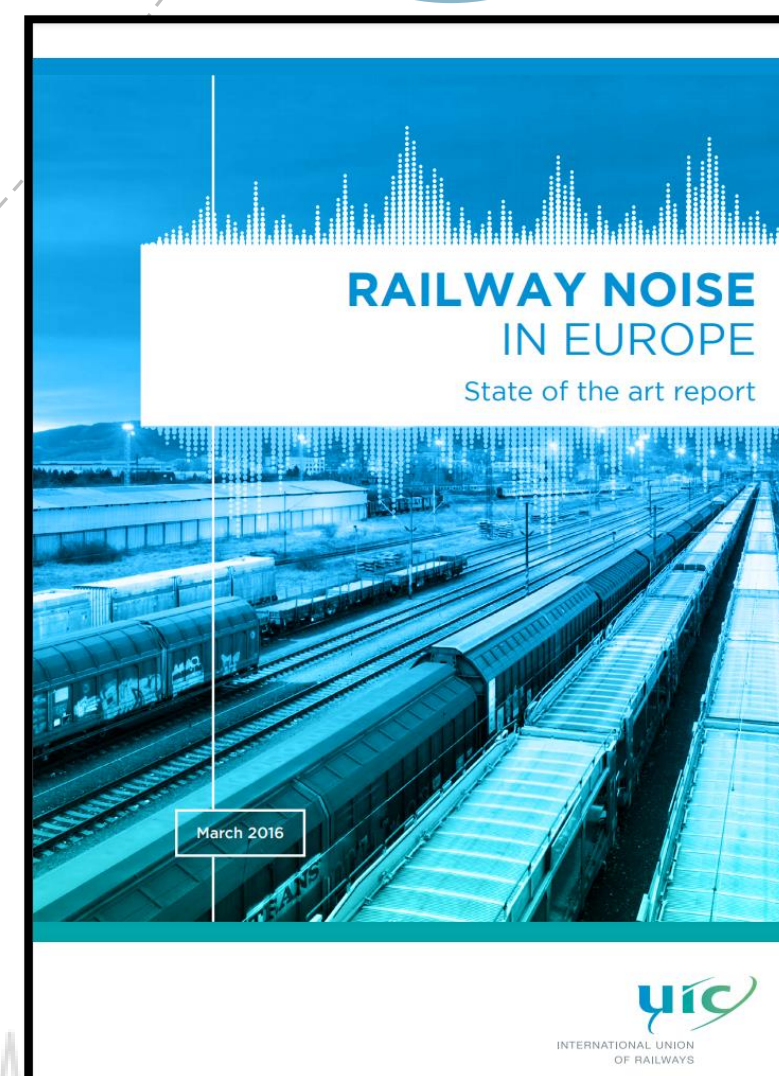
Railway Noise
in Europe

State-of-the-art report

Railway Noise
in Europe

State-of-the-art report

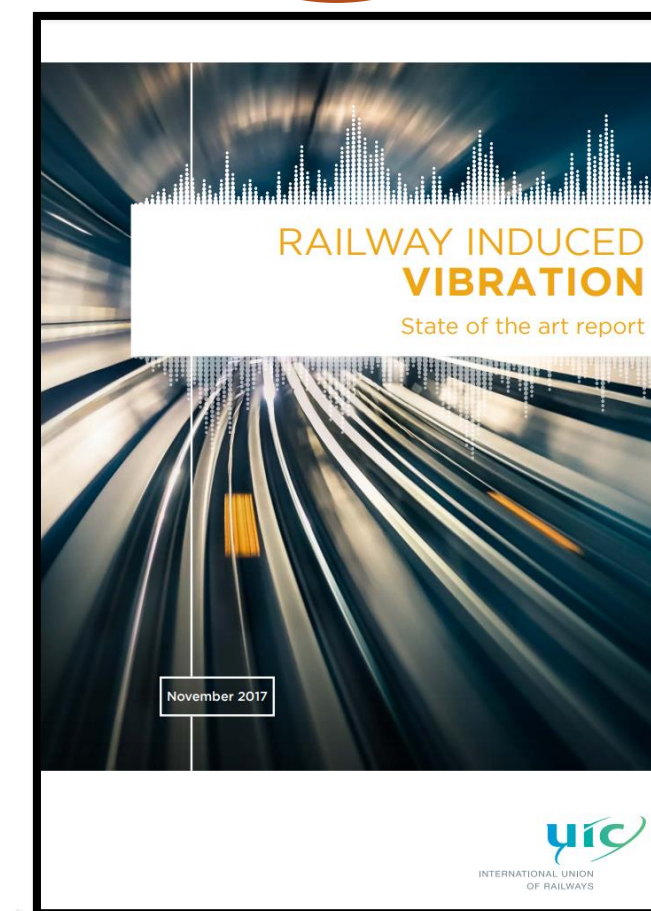
2016



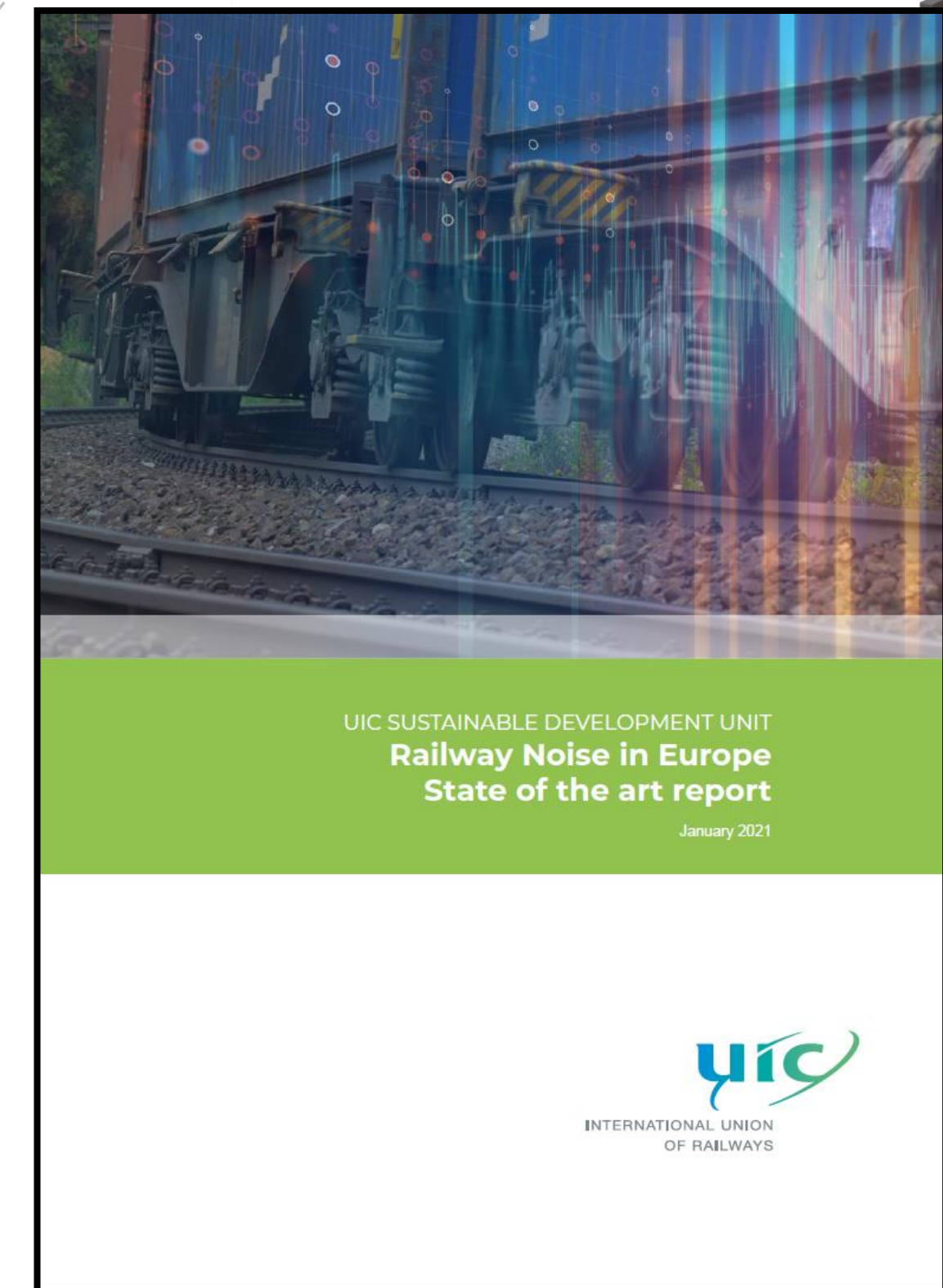
Railway induced
vibration

State-of-the-art report

2017

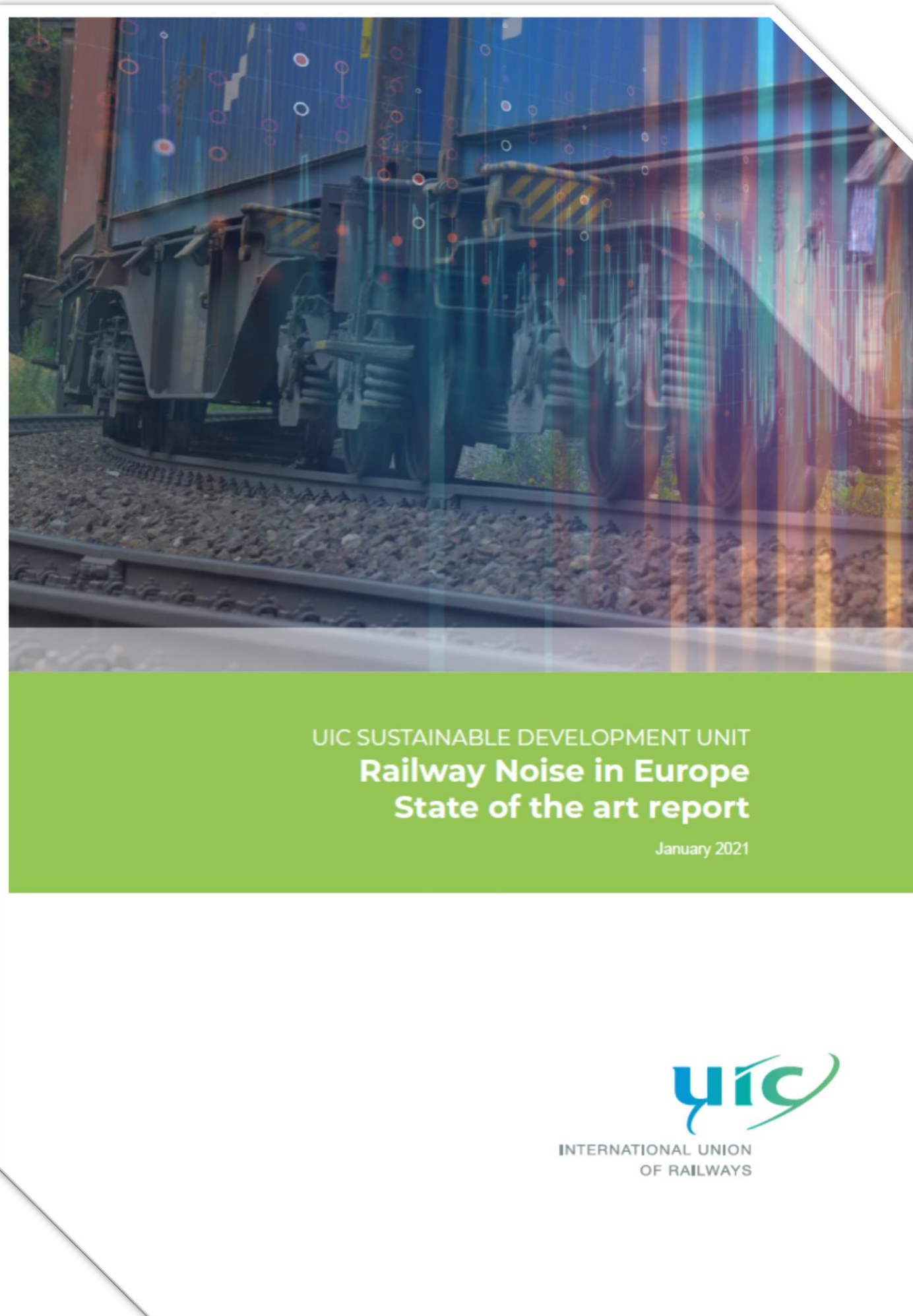


2021

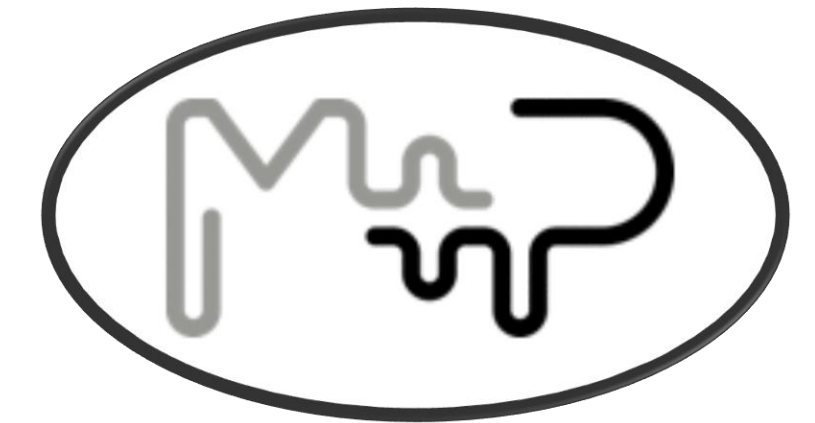


Acknowledgements

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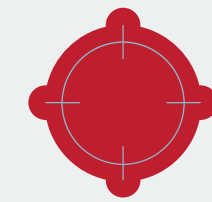


- Commissioned by UIC Sustainability Unit
- Written by M+P raadgevende ingenieurs BV
 - Wout Schwanen
 - Bert Peeters
 - Stefan Lutzenberger
- Edited by Core Group of UIC Noise and Vibration Sector
- Consulted for feedback
 - Members of UIC Noise and Vibration Sector
 - European Commission DG ENV - Marco Paviotti
 - European Commission DG MOV - Nino Zambara
 - CER - Ethem Pekin
 - UIP - Gilles Peterhans



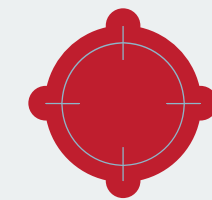
State-of-the-art - Target

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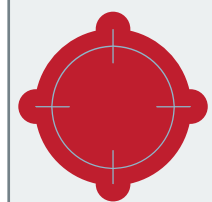
POLICY MAKERS

- Updates and results on technical issues that have changed and developed with EU policies that UIC members have achieved.
- Status on cost of railway noise abatement measures.



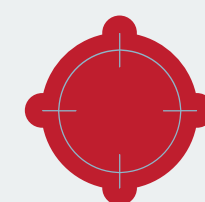
ENGINEERS

- Current updates on technical noise source modelling
- Several examples from UIC members (control methods, abatement measures etc.)
- Results of benchmark studies for noise indicators/models/measurements etc.



EXPERIENCED READERS

- Noise sources
- Noise control methods
- Noise assessment methods
- Implementation

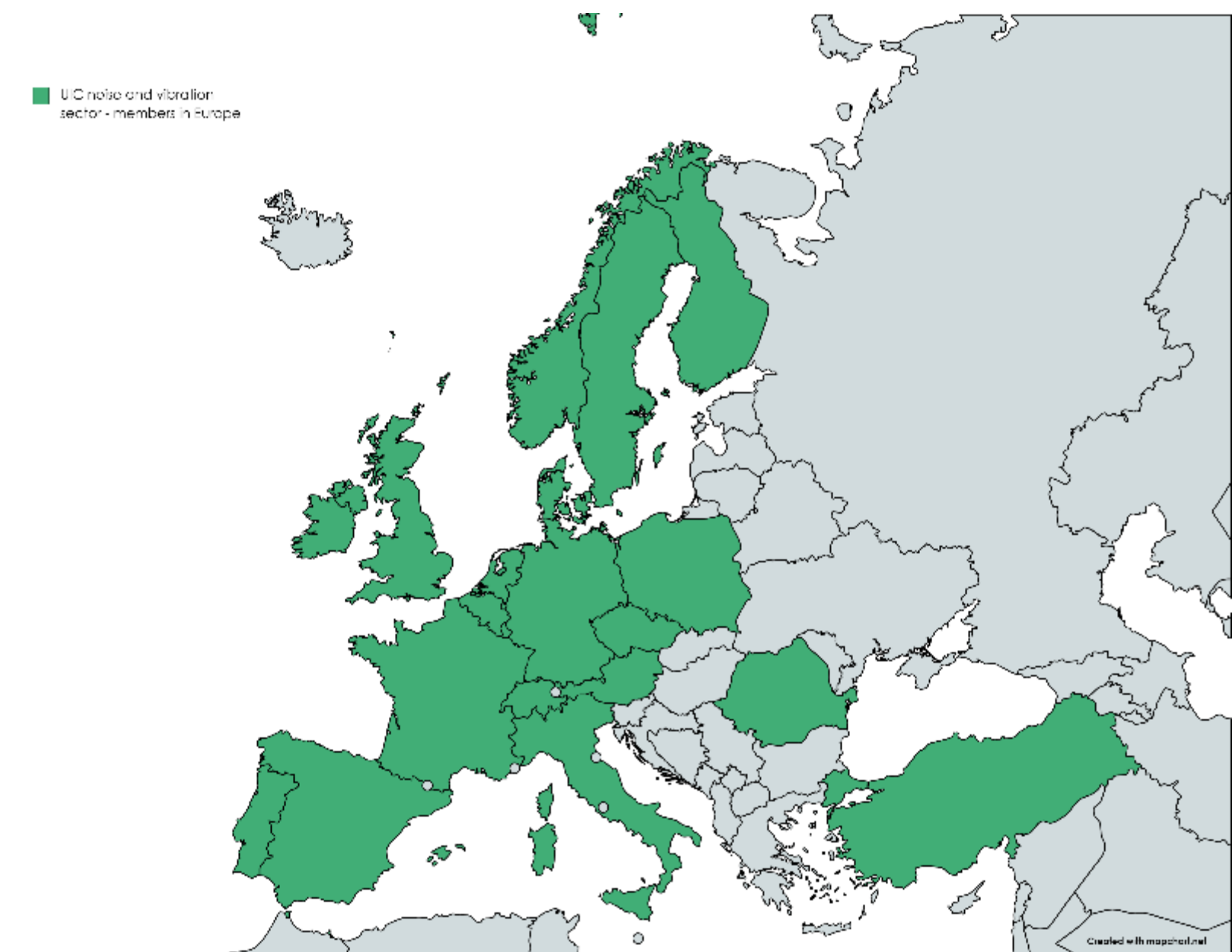


PEOPLE THAT ARE RELATIVELY NEW TO THE SUBJECT OF RAILWAY NOISE

- Big picture
- Noise sources, control and assessment methods
- Cost of environmental noise

The sector has undertaken considerable effort to minimise noise emissions and will continue to do so in the future – all in accordance with the legislation of the European Union as well as that of individual countries.

- ✓ Railways are a sustainable means of transport.
- ✓ Noise mitigation remains a top sector priority.
- ✓ Railways acknowledge the negative effect of noise.
- ✓ UIC and its members have led many research projects that have helped to better understand the noise-generating mechanisms of wheels and tracks.





Competitiveness



Keeping the railways competitive is crucial for the green deal

✂ Requirements

i.e dynamic loads, a minimum life span, the resistance to the effects of moisture etc.



Trade-offs

Measures or goals cannot be always combined or may even contradict each other.



Network capacity



shall be improved!

Minimal maintenance and replacement costs

Damage and vandalism



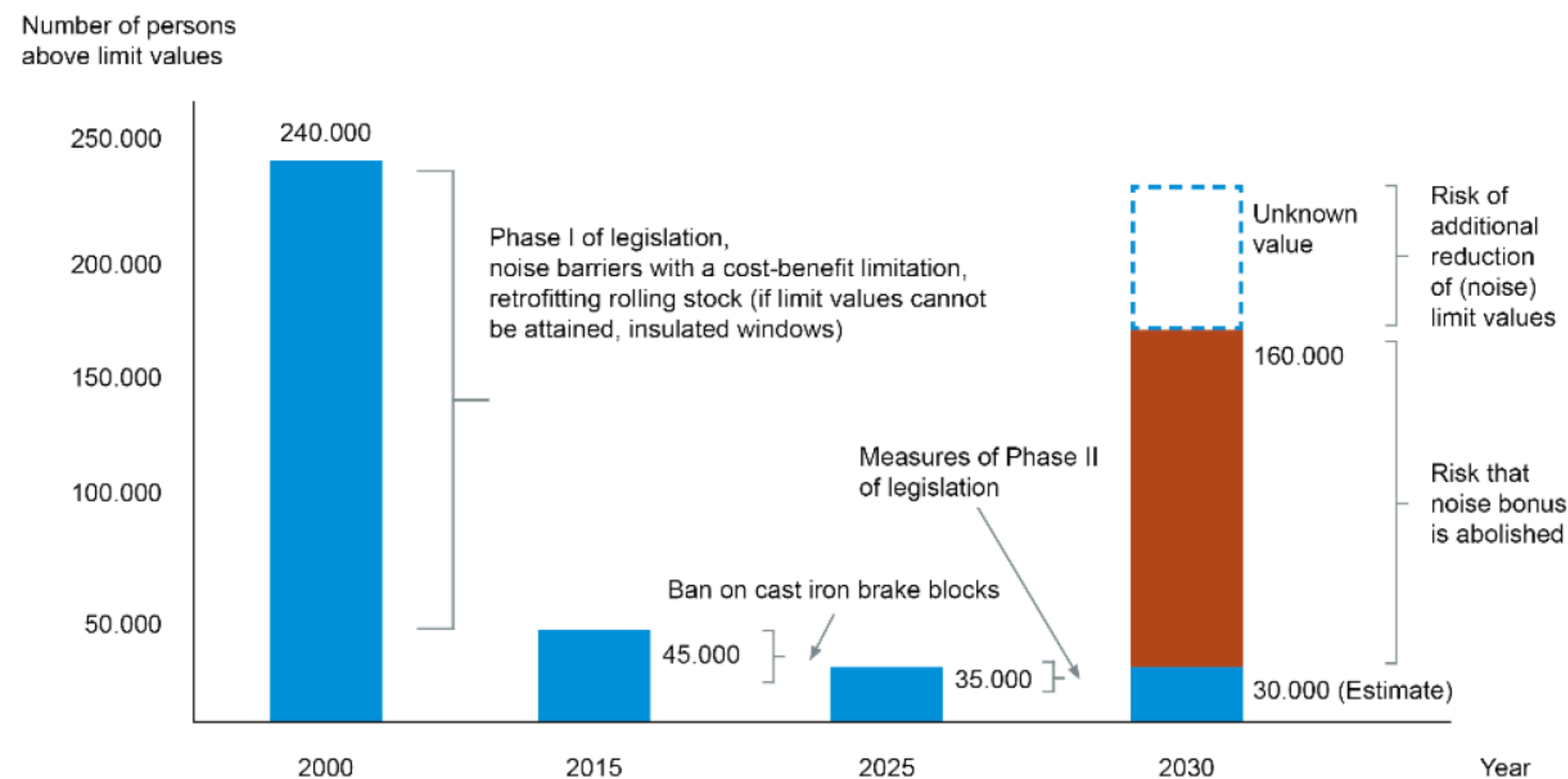
For the successful implementation of rail noise reduction measures, innovative solutions have to be at the heart of any future noise abatement programme. All together, we need to address noise as the last remaining environmental challenge for the European rail sector while fostering the competitiveness of rail freight transport, thereby ensuring a real modal shift to rail and fulfilling the EU's Green Deal objectives.

Gilles Peterhans - Director UIP

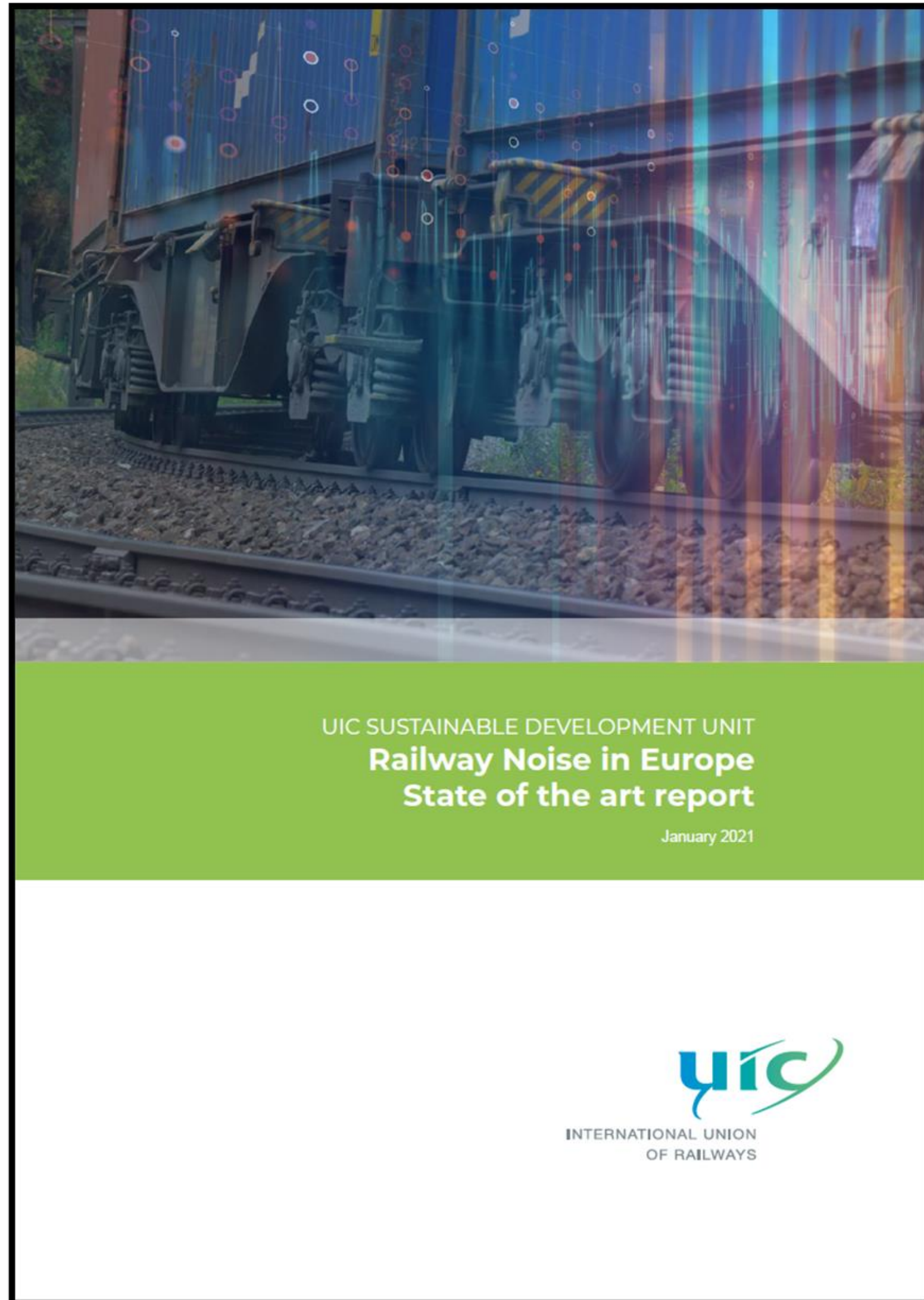
- ❖ Examples of noise legislation in Europe
 - ✓ Current situation
 - ✓ Reducing possible negative effects of infrastructure projects
 - ✓ Reducing and preventing the possible negative effects of traffic growth
 - ✓ Miscellaneous national legislation i.e. noisy freight wagons

❖ Noise annoyance correction factor

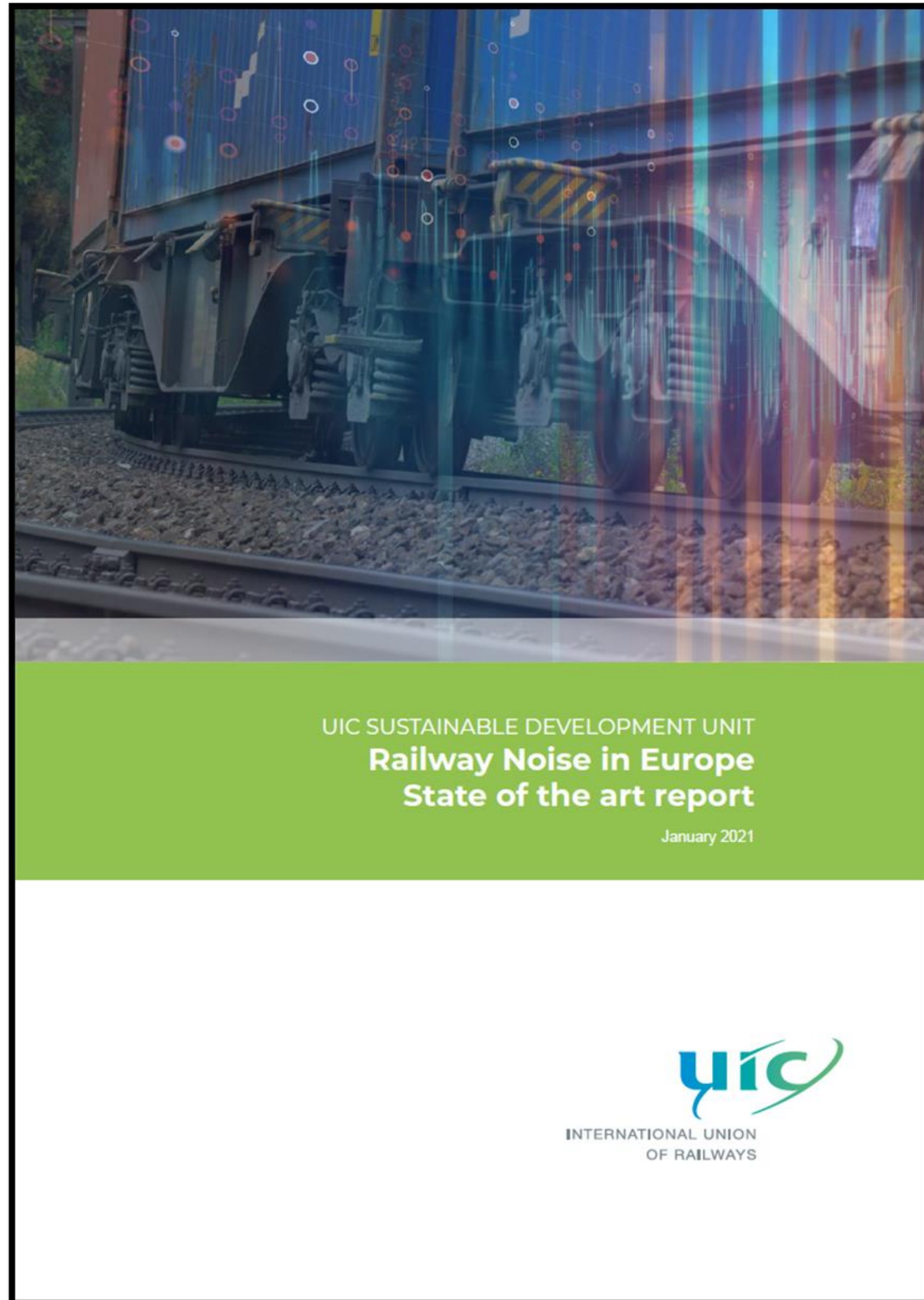
❖ Internalisation of external cost



Content of the report



- The big picture
- Noise sources
- Noise control methods
- Costs for noise measures
- Noise assessment method
- Effect of noise on people
- Costs of environmental noise
- EU policy and legal requirements
- Implementation



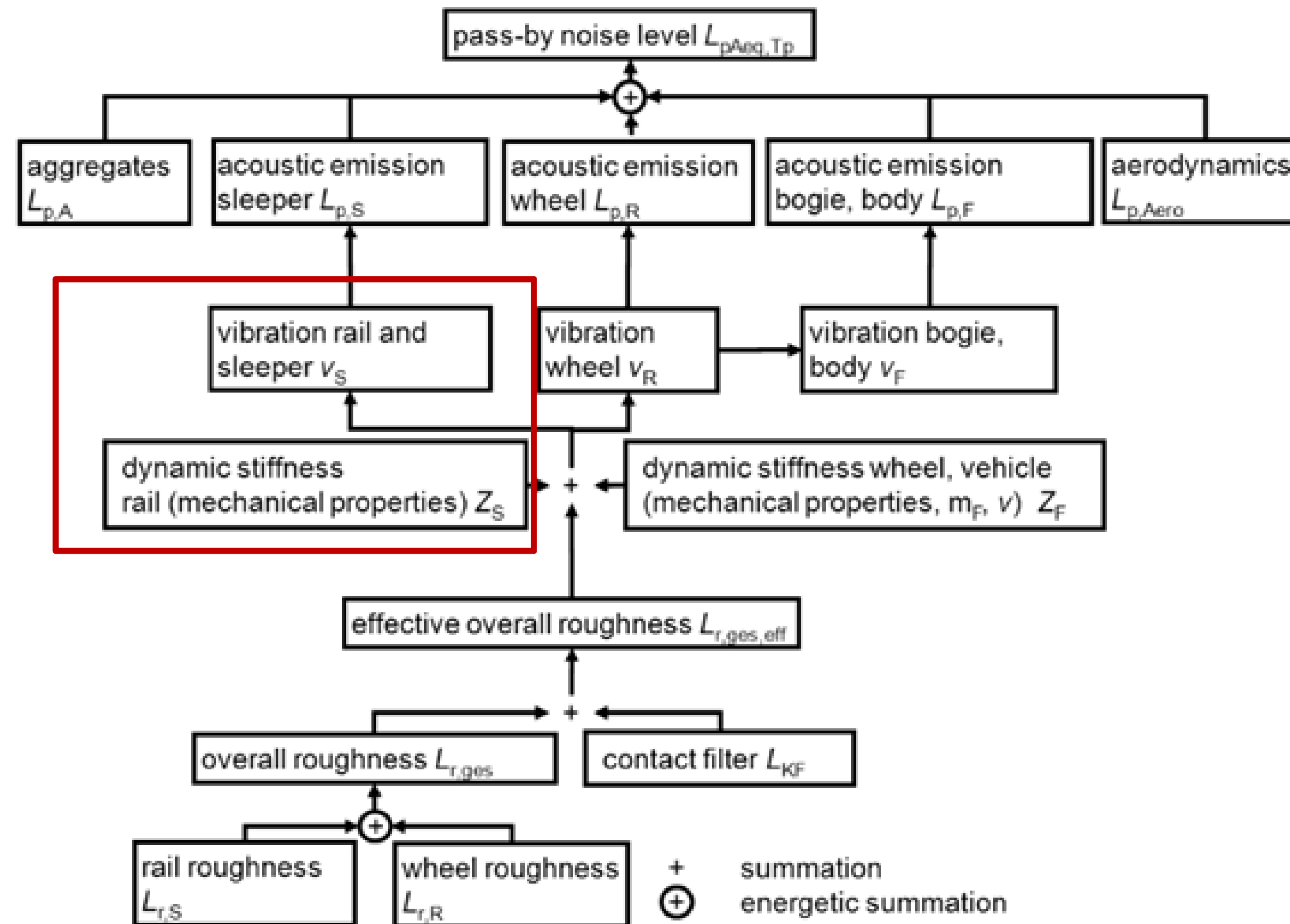
- The big picture
- Noise sources
- **Noise control methods**
- Costs for noise measures
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- EU policy and legal requirements
- Implementation



acoustic
emission

vibration
origin

excitation



- Results of several decades of (scientific) research
- Noise source mechanisms
 - excitation
 - vibration origin
 - acoustic emission
- Measures to be taken and the mechanisms they influence
 - Rail damper

Noise control methods



Measure	High speed traffic	Conventional traffic
optimisation of wheel geometry	1-2	0 -1
wheel dampers	1-5	1-3
bogie skirts	0-2	0 – 3
pantograph design	0-4	No issue
optimised rail pad	-	0 -4
rail dampers	0 -2	0 -3
rail shielding	-	0 -1
rail grinding	0- 3	0 - 5

- EU DG ENV - Phenomena study
 - Benchmarking study on noise mitigation at source/ in the propagation path/receptor
 - Exchanging results and working together on input

Noise control methods & future developments



The research of cost-effective mitigation measures to reduce the noise of the railway system is an exciting challenge. Innovative design, new materials and adapted rules of operation will ensure silent freight and passenger rail transport tomorrow, during pass-by but also when at a standstill and parking for the well-being of residents.

Fabrice Aubin - SNCF



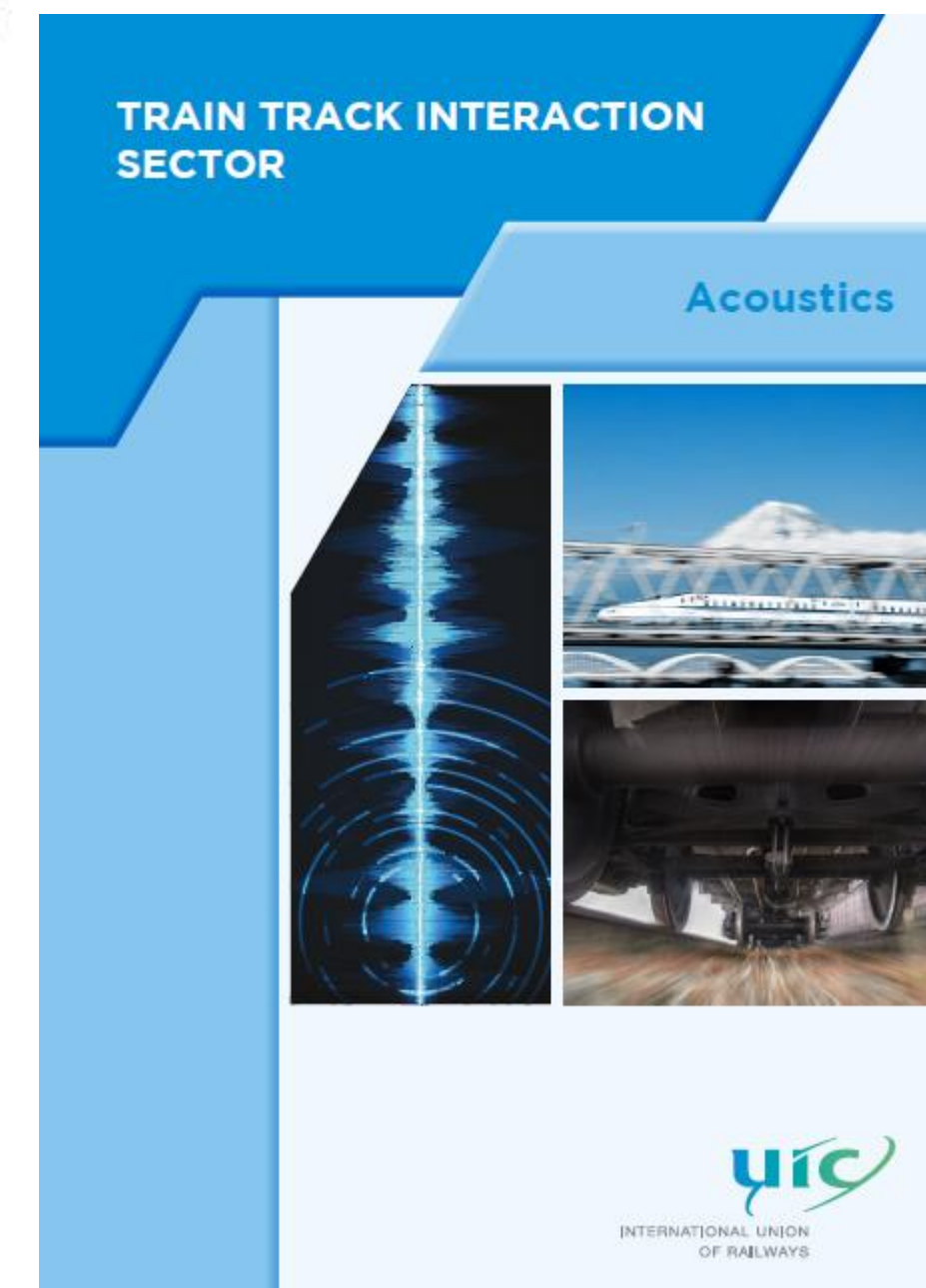
NEWRAIL:
research into solar panels
and noise barriers



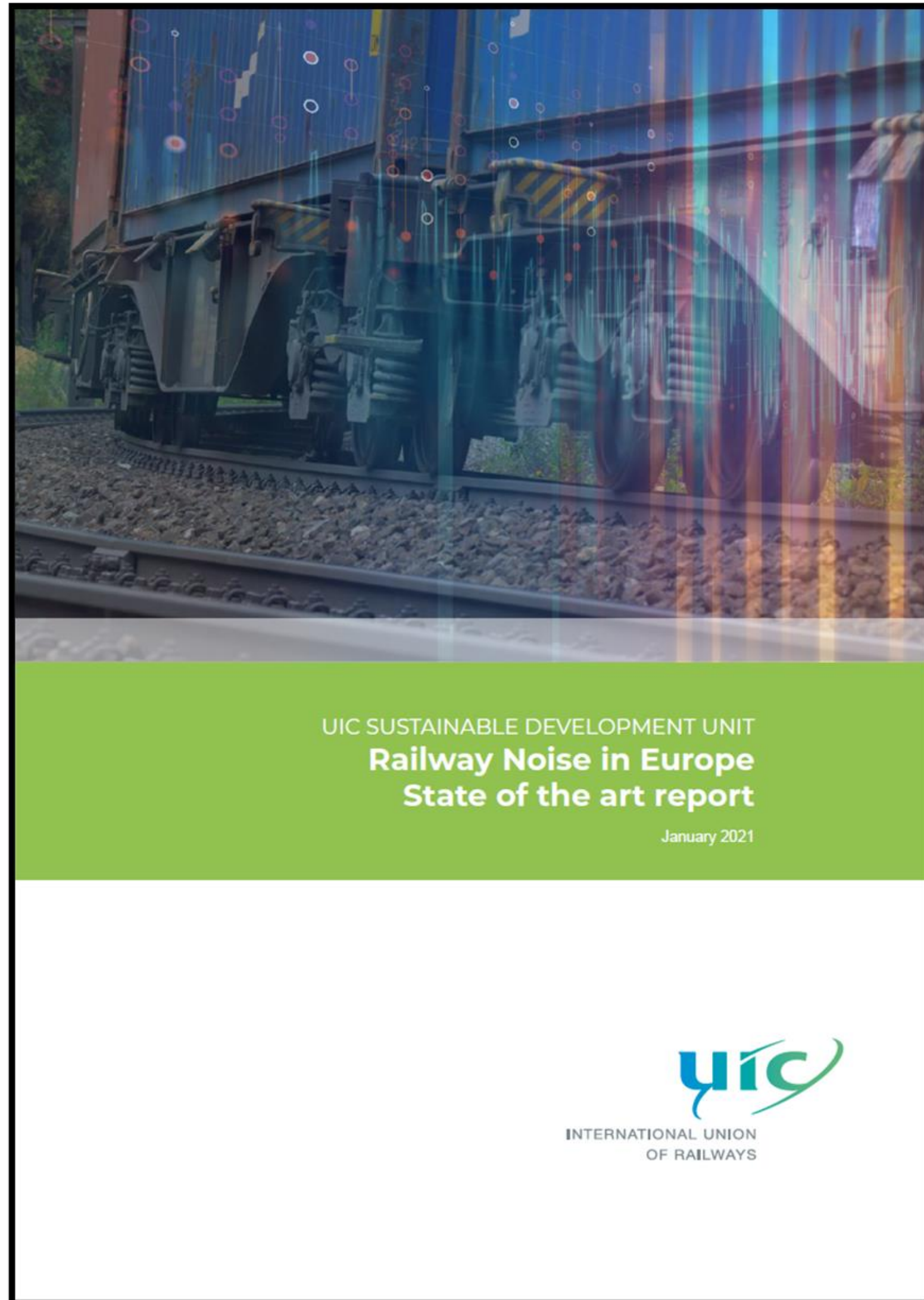
Hydrogen trains will replace diesel units in Groningen

Published on 01-10-2020 at 09:10

source :railtech.com

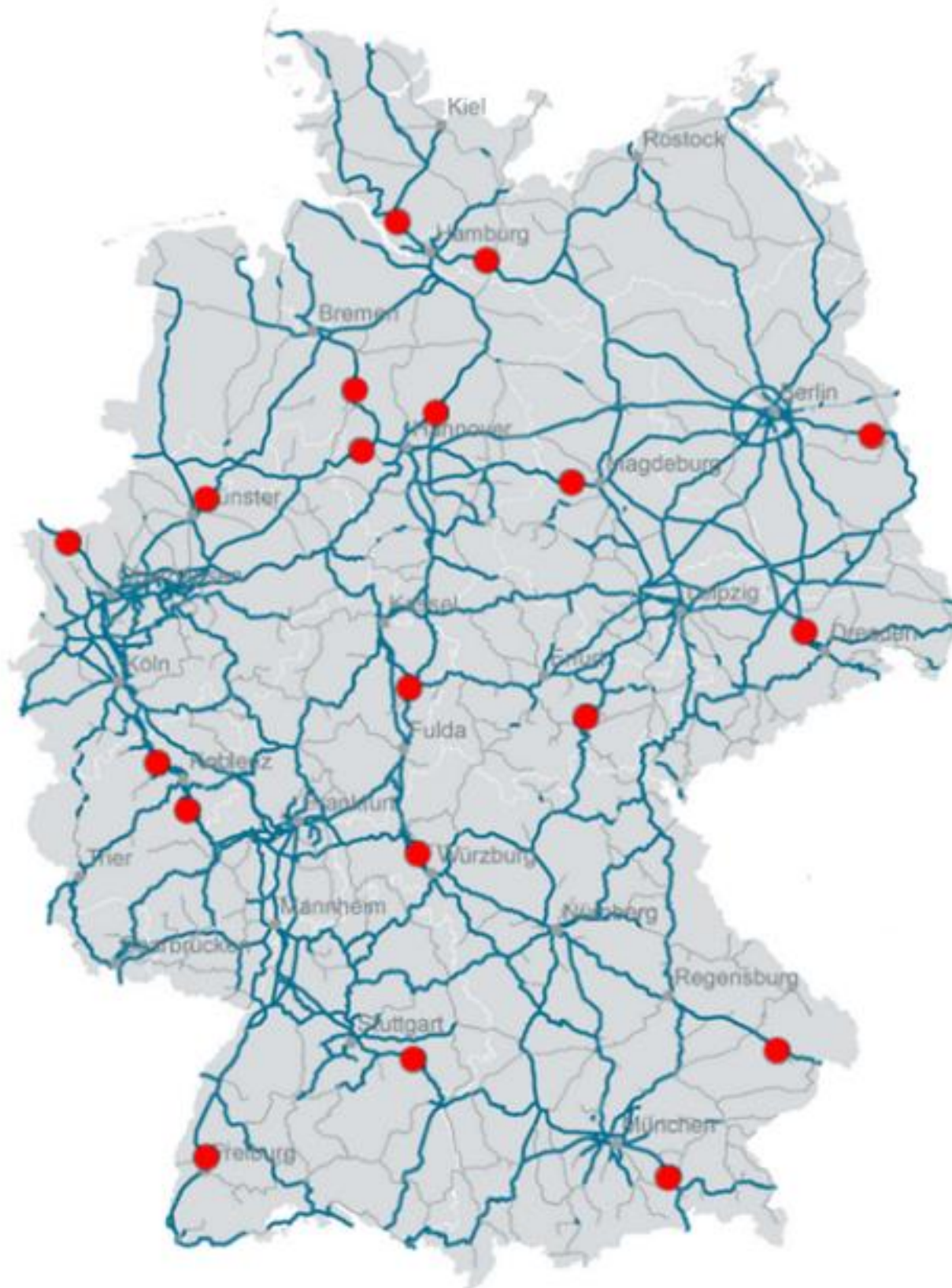


Content of the report

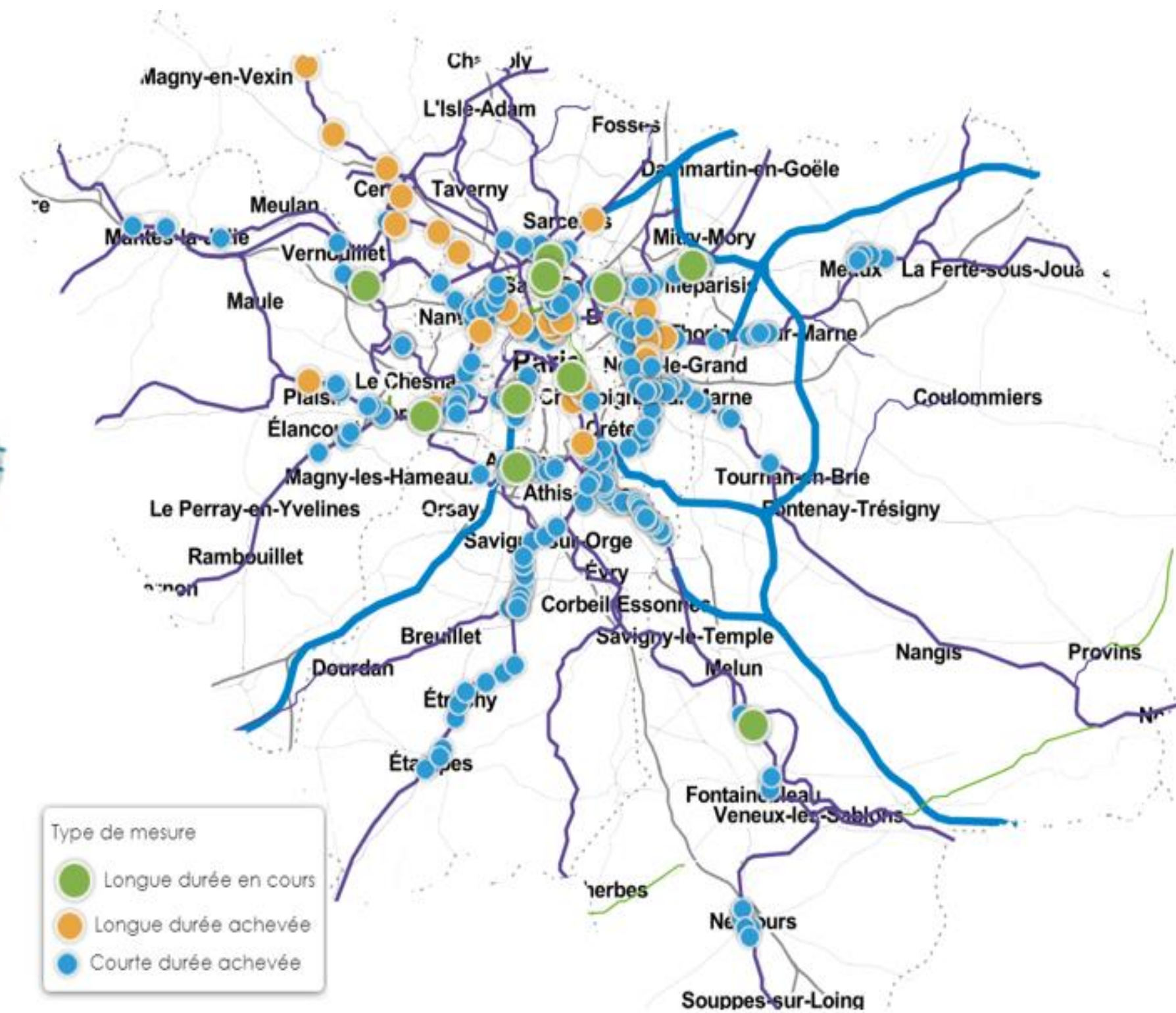


- The big picture
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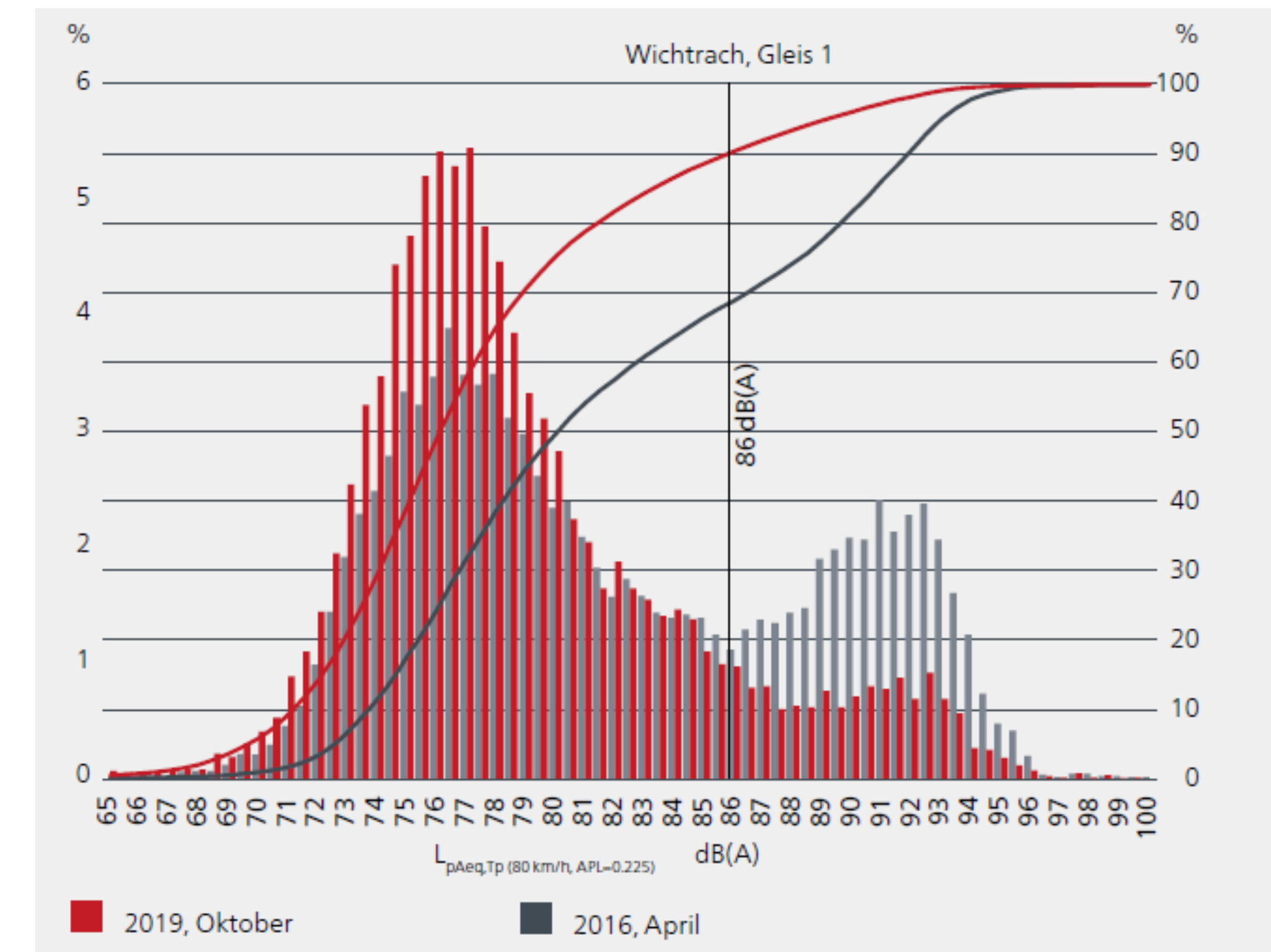
Noise assessment - monitoring



Germany

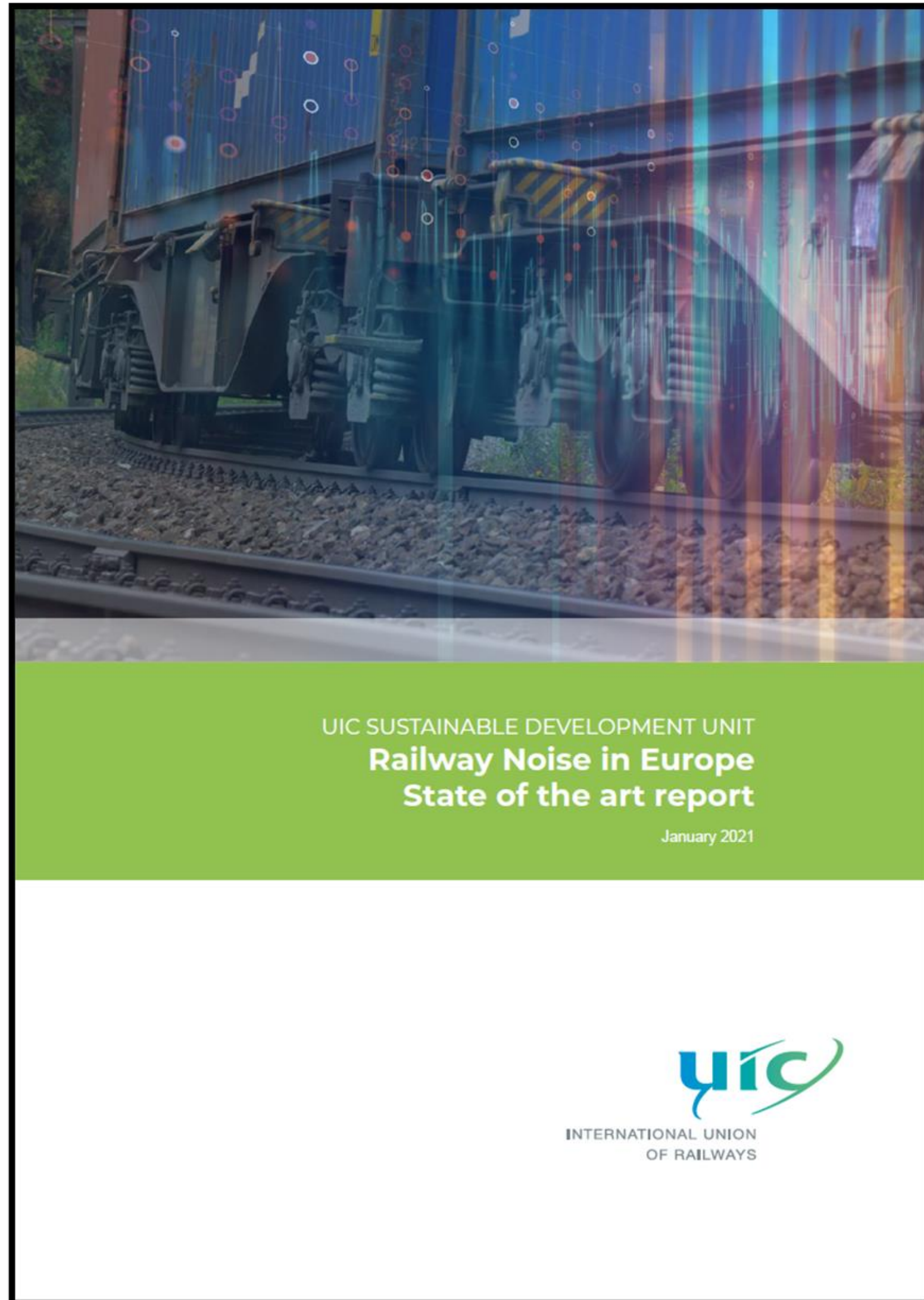


French île-de France region



Switzerland

Content of the report



- The big picture
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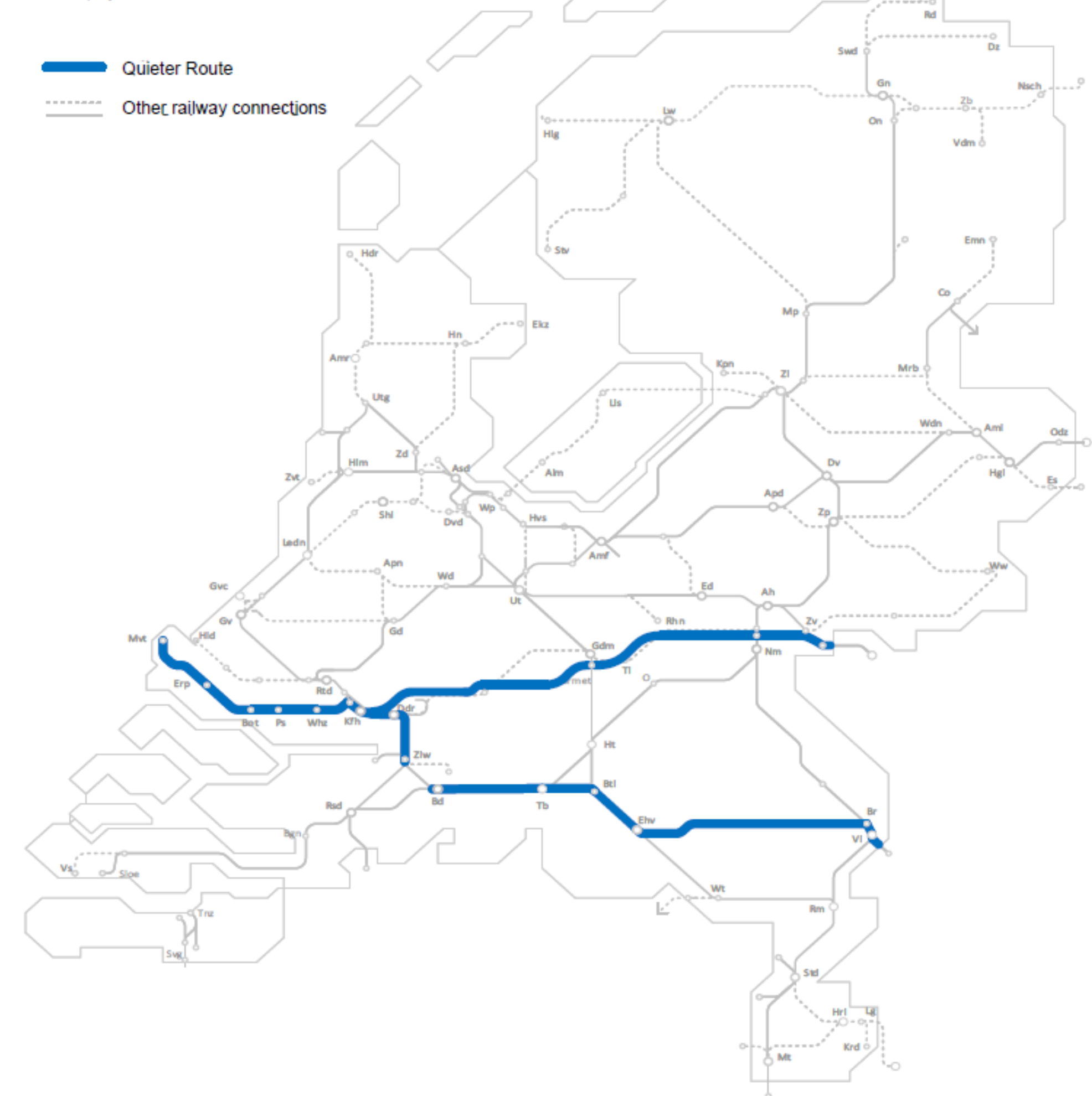
- Main effort to trigger **retrofitting** introduction of Quieter Routes
- **Quieter Route**: minimum of 20 km with more than twelve freight trains during night time (annually averaged daily operated)
- **Spillover effect**: the Quieter Routes will de-facto also limit the number of “noisy” freight trains on non-quieter routes

The “Quieter Routes” that were published in 2019 provide a beckoning perspective for people living along railway lines: lasting quieter freight traffic.

Chiel Roovers - Chairman of the EIM working group of noise and vibrations

TSI Noise: Quieter routes

ProRail, september 2019





- Railways are an essential transport mode to ensure that the goals of the **Green Deal** can be met
- Railway sector is aware that **noise** can be a health problem
 - Noise mitigations on different levels
- Railways have become **quieter** and this trend is expected to continue
- **Competitiveness** of rail sector can be endangered
 - Measures with best cost-benefit ratio have been implemented



- Main research will focus on **track**
 - whole system optimisation
- New technologies to reduce noise from **auxiliary equipment**
- Rail sector is innovative. **New technologies** may be beneficial for noise
- Interest in **ground vibrations** increases.
- **The target is and will be to enable more rail traffic while reducing the noise**

Thank you for your attention

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https://uic.org/IMG/pdf/railway_noise_in_europe_state_of_the_art_report.pdf

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INTERNATIONAL UNION
OF RAILWAYS



Pierre Etienne GAUTIER

SNCF Réseau
Chair of UIC Train-Track Interaction sector

UIC TTI (Train-Track Interaction) Sector

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➤ SG Aerodynamic and Acoustics

➤ SG Pantograph-Catenary

➤ SG Railway Dynamics & Gauges

➤ Hyperloop initiatives

COMING SOON



Published in 2018



Published in 2020, available at <https://www.shop-etf.com/en/>



3 Focus Areas:

- Noise source generation
- Acoustic comfort
- Ground-borne vibration

TTI White Paper on Acoustics

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For each focus area, the relevant information was gathered from amongst the participating members in order to respond to the following questions:

- *What is the state of the art, i.e. the current level of knowledge of the topic in the sector?*
- *Is this particular topic taken into consideration by standardisation bodies?*
- *What are the outstanding issues in terms of regulation and standardisation (TSIs, CEN, ISO, other standards)?*
- *Is the topic included in any current research programmes at European, national or company level?*
- *What elements need to be considered in future research programmes?*

*Based both on these answers and on the discussions between the partners,
ideas for technical projects are then proposed*



Noise Source Generation

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Focused on the topics which are currently investigated or have been identified as open points in the standards, and then showing ideas for future projects on:

✓ **Rolling noise** – Wheel/rail contact,...

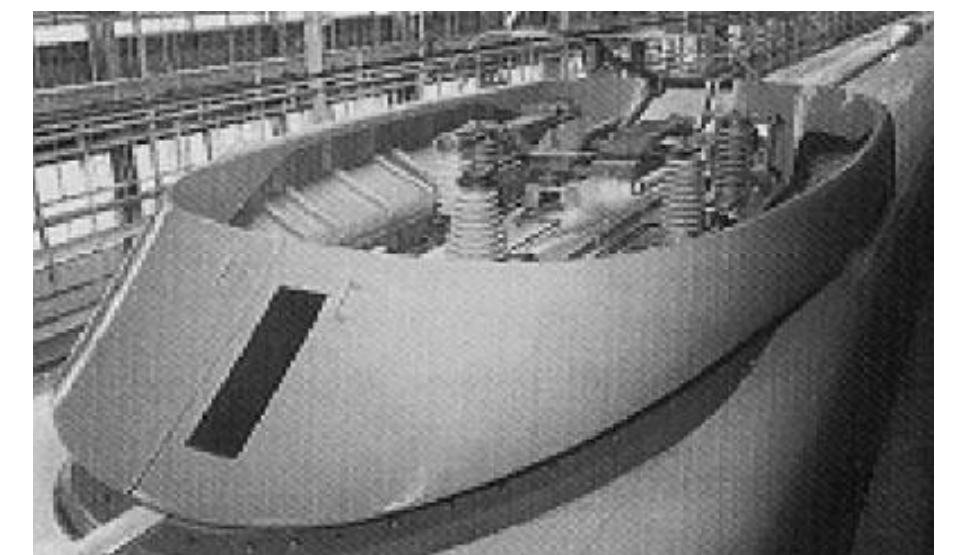
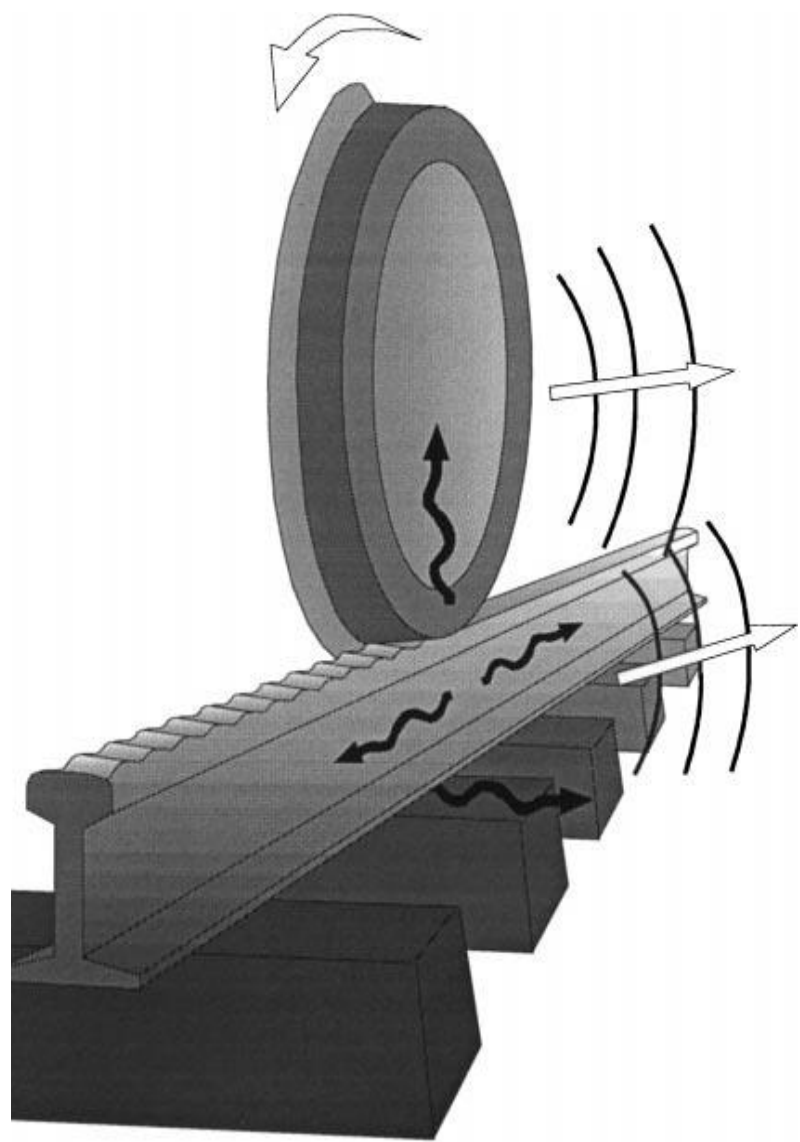
✓ **Local phenomena** – Squeal, bridges,...

✓ **Aerodynamic noise** – Pantograph, recess,...

✓ **Mitigation measures** – Dampers, shielding,...

• **Future innovative research programmes within the TTI Sector:**

- Rolling noise for slab-track
- Rail roughness linked to track characteristics, to rolling stock, to grinding plan,...
- Influence of track parameters on curve squeal noise using on-board recorded data
- Specification and validation of rolling stock characteristics regarding aerodynamic noise sources
- Acoustic efficiency of innovative and low height noise barriers



*Railway noise is perceived both inside and outside the trains, affecting people in different ways. **Acoustic Comfort, Subjective Perception & Psychoacoustic Indicators** should be analysed*

- **Future innovative research programmes within the TTI Sector:**

- ✓ **Exterior noise:**

- Annoyance due to multi-exposition (Noise + Vibrations)
- Annoyance due to low frequencies (<100 Hz)
- Common European short-term noise indicators L_{AMAX} ? L_{Aeq} ?

- ✓ **Interior noise:**

- Track contribution to interior noise:
 - Potential participation of the Track Experts Group
 - Transfer Path Analysis (TPA)
- Interior comfort specification for rolling stock, including a proposal for new indicators.



pictures by Empa, Switzerland

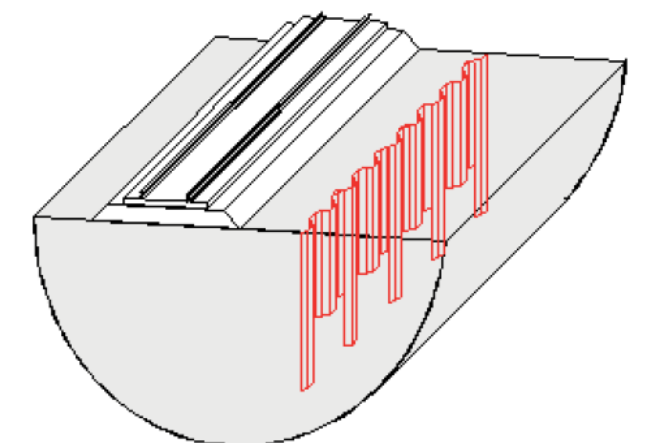
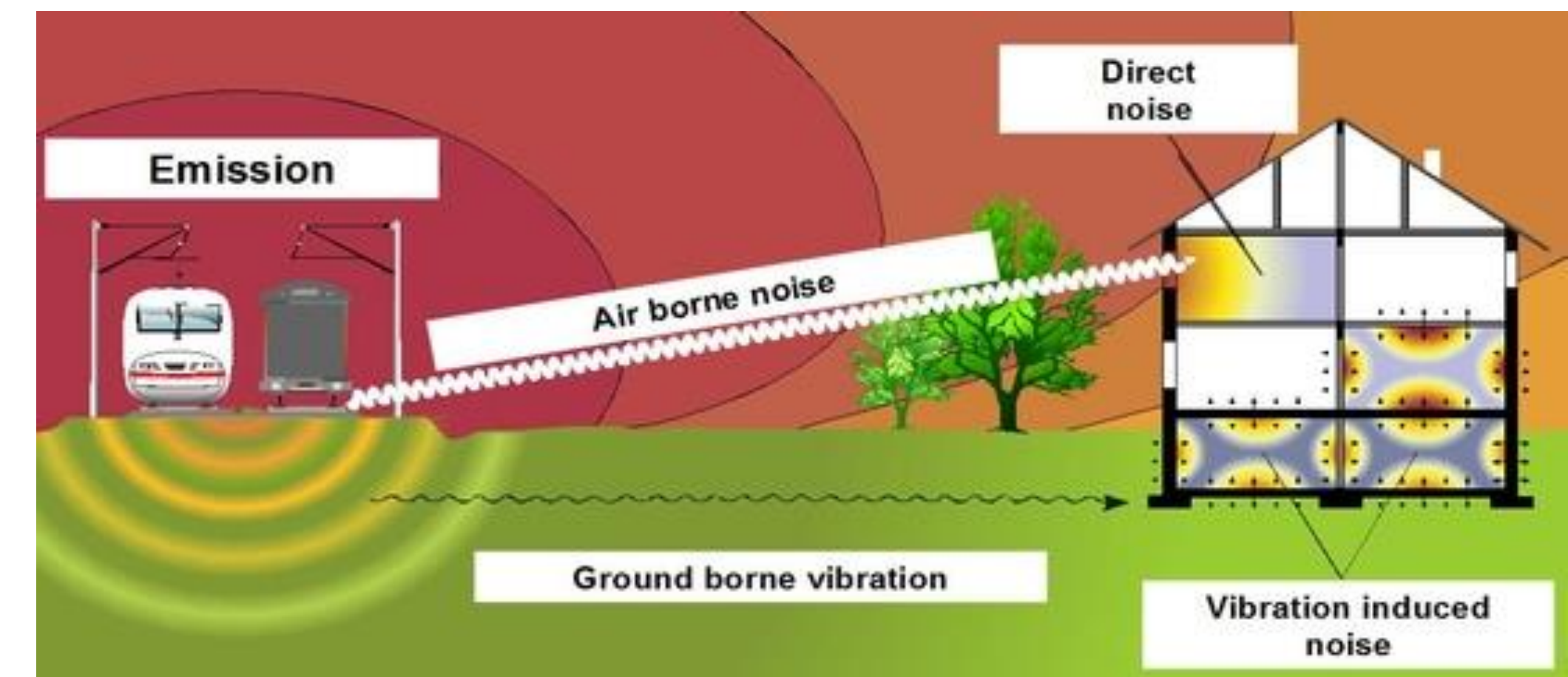
Ground-borne vibration

114

Residents close to railway lines are also exposed to vibration related phenomena. It is generated at the wheel-rail interface, and can reach foundations of buildings

- ***Future innovative research programmes within the TTI Sector:***

- *Guideline on numerical modelling analysis and mitigation measures for induced vibrations*
- *High frequency dynamic stiffening of rail pads, USPs, UBM's, fastenings,..*
- *First approach on increase of vibration after installing noise barriers*
- *Mitigation measures such as Low stiffness fastening systems, USP, Piling walls,..*



UIC Railway Noise Days

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How Railways Become Good Neighbours – 24 February



“How Railways Become Good Neighbours”

09:00 Welcome remarks: Christian Chavanel, UIC Rail System Department Director

09:10 Introduction: Pierre-Etienne GAUTIER, Chair of the UIC TTI Sector & SNCF Réseau

Mercedes GUTIERREZ / David MIRAYO, UIC TTI Senior Advisors

***** UIC White Paper on Acoustics*****

09:20 White Paper presentation- Baldrik FAURE, SNCF

09:40 Aerodynamic Noise- Claire CHAUFOUR, SNCF / Gennaro SICA, HS2

10:00 Impact noise in railway crossings- Jens NIELSEN, Chalmers University

10:15 Acoustic comfort, subjective perception- Reto PIEREN, EMPA

10:30 Coffee break – break-out rooms

11:00 Shift2Rail solutions contributing to noise and vibration mitigation - Judit SANDOR, Shift2Rail, Programme Manager

11:15 Ground-borne vibration. Prediction models for railway induced vibration in the built environment. (SILVARSTAR) - Geert DEGRANDE, University of Leuven

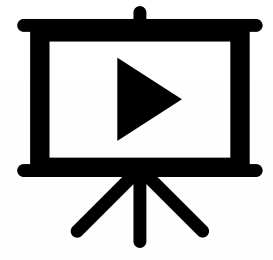
11:30 Ground vibration, and the need and requirements for developments of prediction tool from the railways perspective (FINE-2) - Rüdiger GARBURG, Deutsche Bahn AG

***** Special topics *****

11:45 Railway Noise Mitigation Framework in Europe - Jakob OERTLI, Chair of the UIC Noise and Vibration Sector, SBB

12:00 Identifying key issues for future research, Q&A, Concluding remarks - Pierre-Etienne GAUTIER, SNCF Réseau

12:20 Closed



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YouTube Channel



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Questions & Answers Concluding remarks

Concluding remarks by Jakob Oertli

https://uic.org/events/IMG/pdf/concluding_remarks_j.oertli_uic_railway_noise_days.pdf



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Thank you for your attention.