



Factors **M**Oderating people's **S**ubjective reactions to **r**oad **n**oise - **G**uidebook on how to reduce noise annoyance

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Organisation of the FAMOS project

Consortium Partners:

- FORCE Technology in Denmark (Project leader)
- LÄRMKONTOR in Germany
- SINTEF in Norway



Project period:

- December 2019 to March 2022

Homepage:

<https://famos-study.eu/>

Performed for:

- CEDR Conference of European Directors of Roads
- Transnational Road Research Programme Call 2018: Noise and Nuisance

Funded by the CEDR members of:

- Belgium – Wallonia
- Denmark
- Ireland
- Netherlands
- Norway
- Sweden
- United Kingdom



The FAMOS challenge!



- Road administrations can use all the technically feasible and economically possible measures to reduce the noise in road projects
- There might still be a need for a further reduction of annoyance to achieve acceptable conditions for people living along roads

Method:

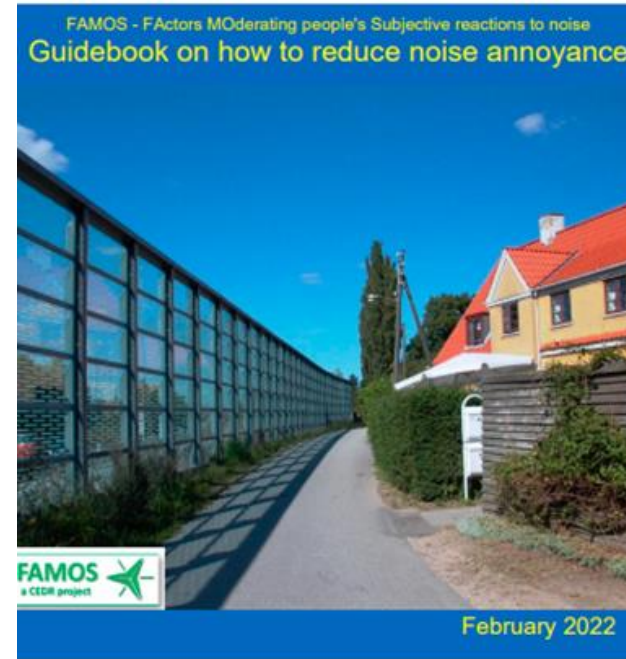
- To analyse and test if non-acoustic moderators for noise annoyance can be a promising tool to reduce the annoyance without further reducing the noise level



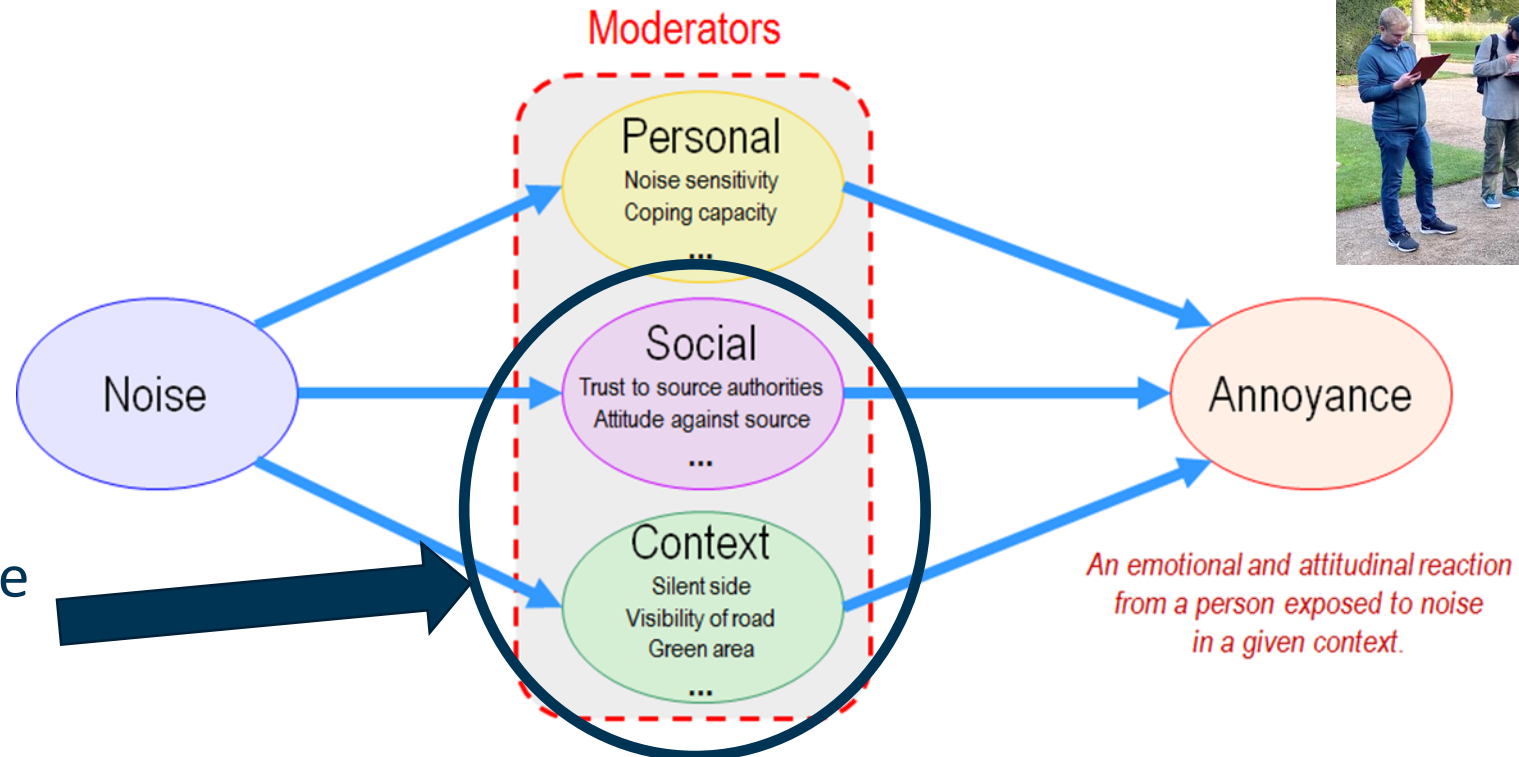
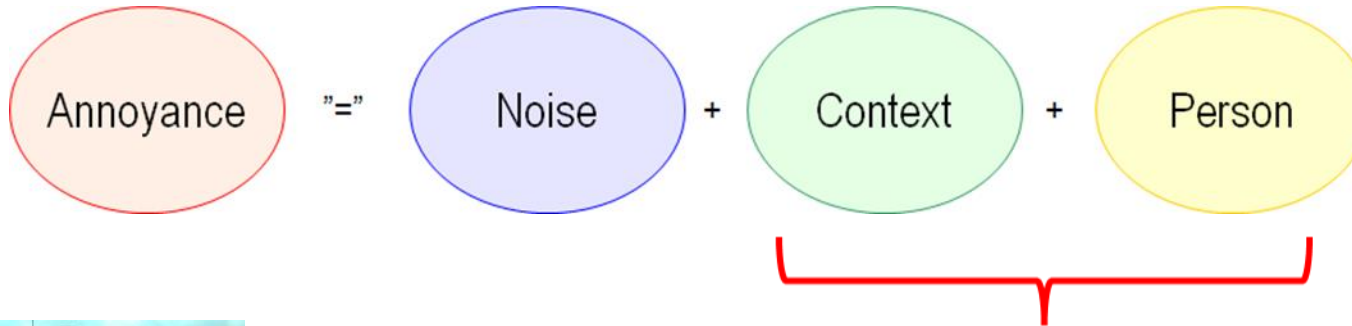
Main results:

- Practical guidebook about how noise annoyance from road traffic can be reduced by applying non-acoustic moderators
- Project report with documentation

See :<https://www.cedr.eu/peb-research-programme-2018-noise-and-nuisance>



Moderators to perceived noise annoyance

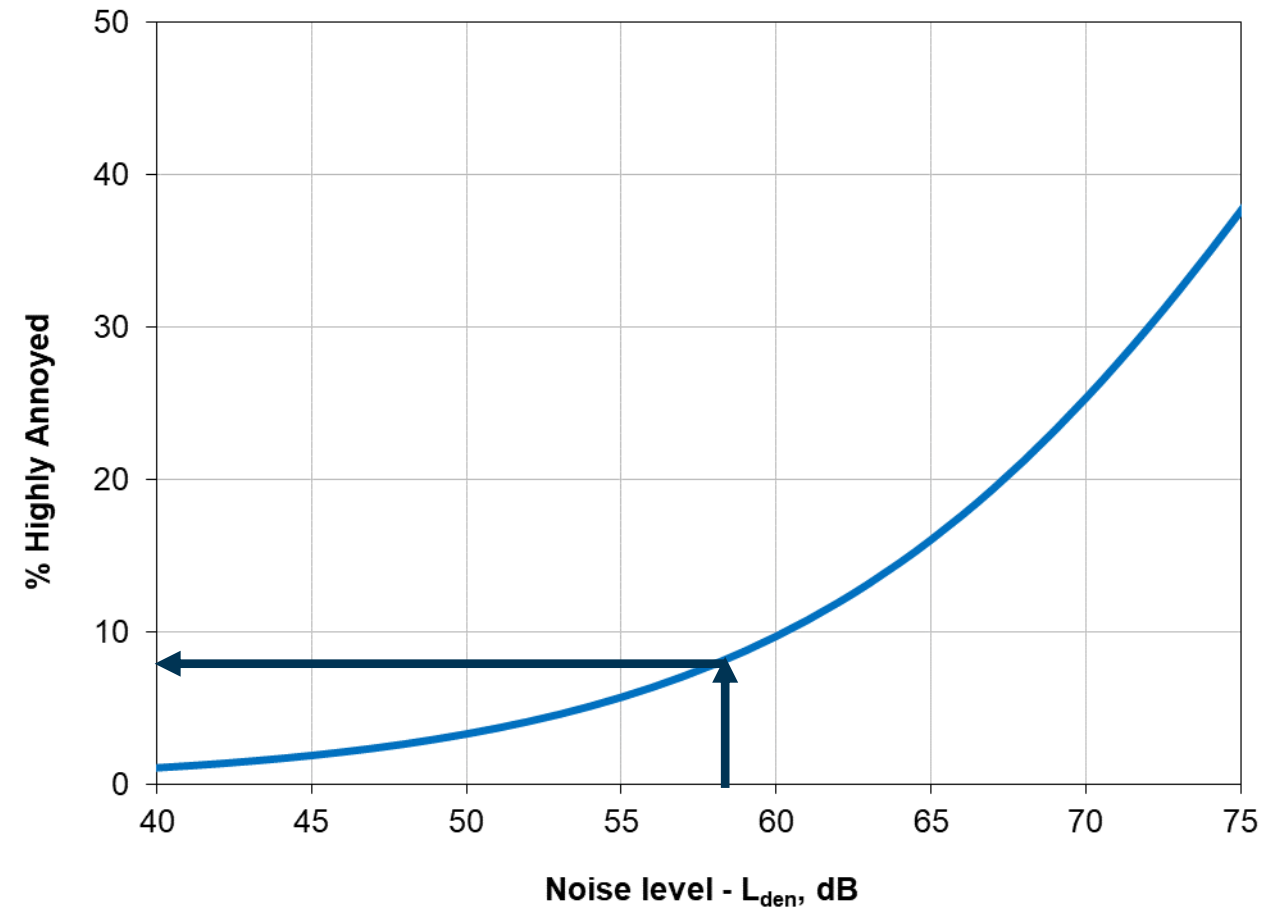


FAMOS is about moderators that can be controlled by National Road Administrations

The EU dose-response curve for road noise

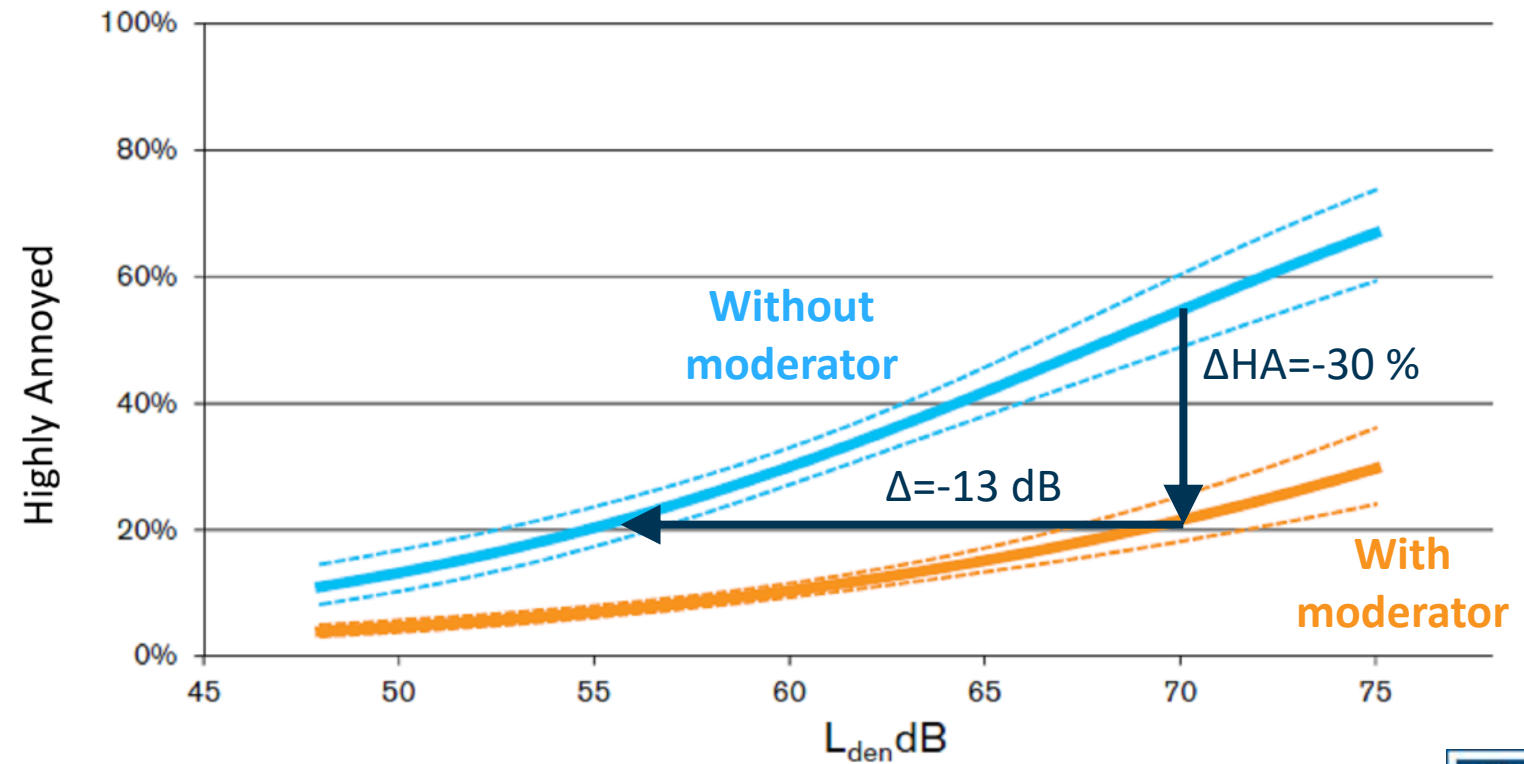
- Based on 19,172 respondents in 26 surveys
- Primarily in Europe
- 7.9% highly annoyed at 58 dB
- Background for noise guidelines in Europe

European Commission: Position paper on dose-response relationships between transportation noise and annoyance, 2002



Fundamentals for Moderators

- Annoyance equivalent noise level shift L_{eas}
- The (hypothetical) shift in noise level that will give the same change in annoyance as the presence of a moderator



The FAMOS organisation

WP0 Project management (FORCE Technology)

WP1 Moderator search and qualification (SINTEF)
International literature search
Contact to key researchers
List of moderators

Tomorrow!

WP2 Analysing data and hypotheses testing
(FORCE Technology)
Analyse effect of moderators
AudioVisual listening tests
Mini surveys
Sound walks

WP3 Modelling
(FORCE Technology)
Modelling of moderators based on data
Dose-response curves for moderators

WP4 Guidelines and report
(Lärmkontor)

Guidebook for National Road Administrations
Project report
Dissemination

Today!

The moderators of the FAMOS project



1. Trust / Acceptance
2. Expectations met
3. Traffic volume
4. Safety expectation
5. Vegetation and greenery / visual appearance of the surroundings
6. Noise barriers (expectations to noise reduction and visual appearance)
7. Access to quiet side/orientation of residences
8. Neighbourhood soundscape

Trust / Acceptance

- Peoples attitudes towards authorities and road owners
- **Shift 20 dB from highest trust to lowest trust**
- Tools: Good, honest and including public participation process



See ON-AIR
Guidance Book
by CEDR



CEDR Contractor Report 2017 - 03



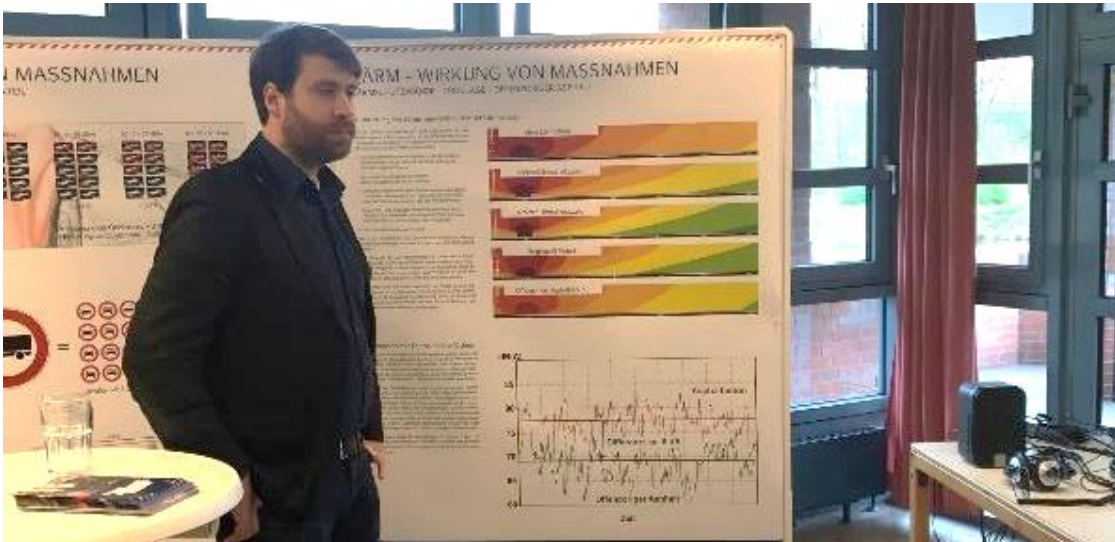
ON-AIR
Guidance Book on the Integration of Noise
in Road Planning

September 2017



Expectations met

- New noise barrier, new road, etc.
- **Shift of about 5-10 dB**
- Tools:
 - Realistic expectations
 - Exhibitions, workshops, working groups, stakeholders groups, noise demonstrations, sound walks, information material, etc.



Traffic volume

- Annoyance increases more rapidly than would be expected from the noise level itself
- **Shift about 1.5 dB per doubling of traffic**
- Danish studies show that motorways are 6-7 dB more annoying than urban roads

TEKNISK NOTAT

Genevirkning af vejtrafikstøj – et litteraturstudie

Udført for Miljøstyrelsen

Sagsnr.: 120-33634

TC-101644

Side 1 af 43

Hørsholm, 26. januar 2021

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Safety expectation

- Perceived safety in the neighbourhood
- **Shift of about 5 dB**
- Tools: General traffic safety work, speed reduction and control, traffic calming, etc.



Vegetation and greenery / visual appearance of the surroundings

- **Presence of greenery shift as much as 10 dB**
- Tools: Green vegetation, trees, bushes, grass, etc.
- **Visibility of the road shift about 2-10 dB**
- Tools: Hiding the road behind a fence, barrier, building, vegetation, etc.



Noise barriers (expectations to noise reduction and visual appearance)

- **Visual appearance: about 2 dB**
- Tools: Designs and materials, earth wall, barrier, greenery, etc.
- **Expectations to noise reduction: shift of 5-10 dB**
- Tools: Good public information and involvement, give people “ownership” to barrier



Access to quiet side/orientation of residences

- **Shift of 5-10 dB**
- Tools:
 - Noise-sensitive rooms away from noise source
 - Noise protection for terraces
 - Local noise barrier in garden

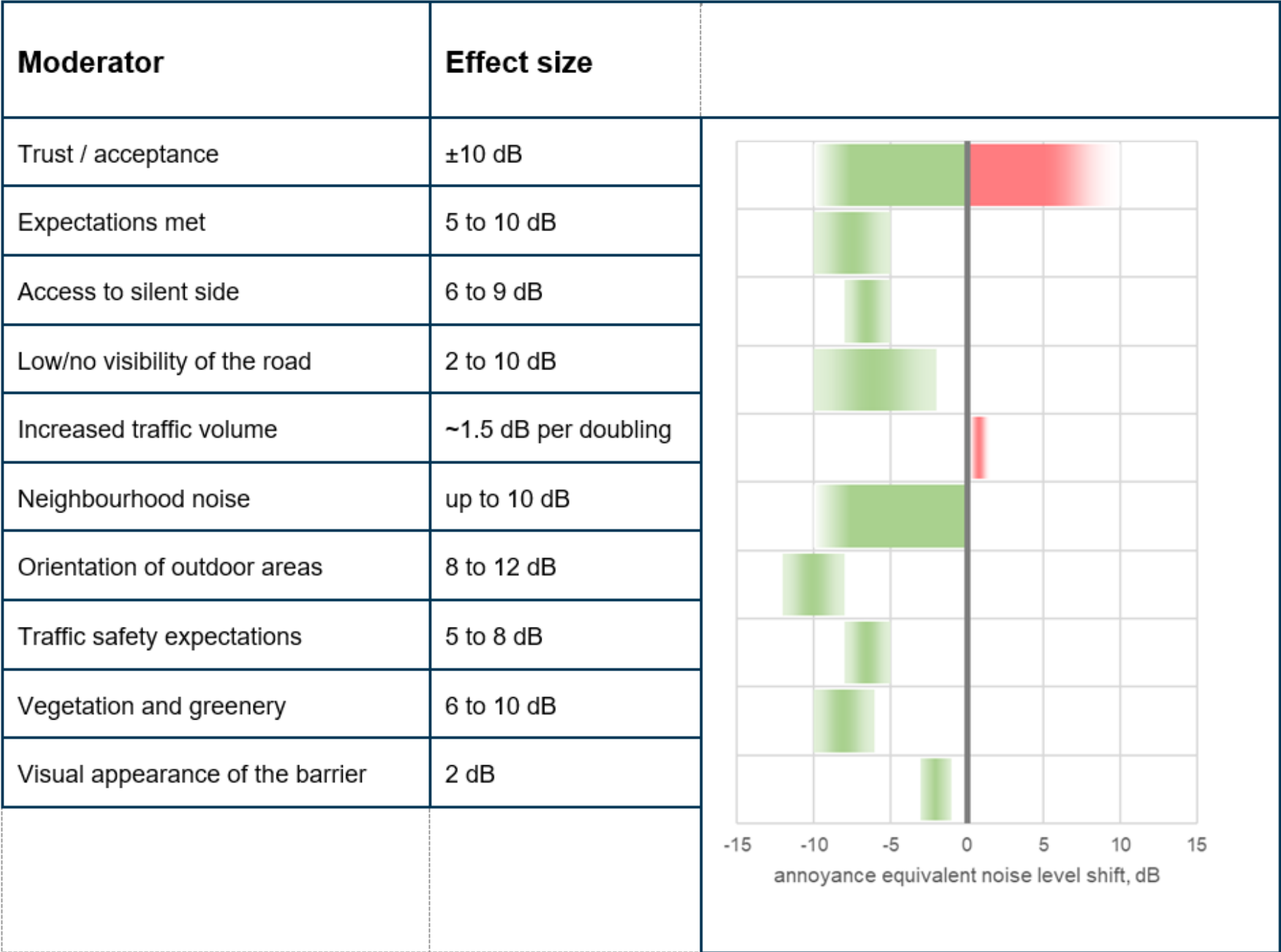


Neighbourhood soundscape

- **Shift up to 10 dB**
- Soundscape qualities of the neighbourhood
- Tools:
 - Quiet neighbourhoods with less car traffic
 - Quiet local parks / green areas
 - Oasis with “less” noise

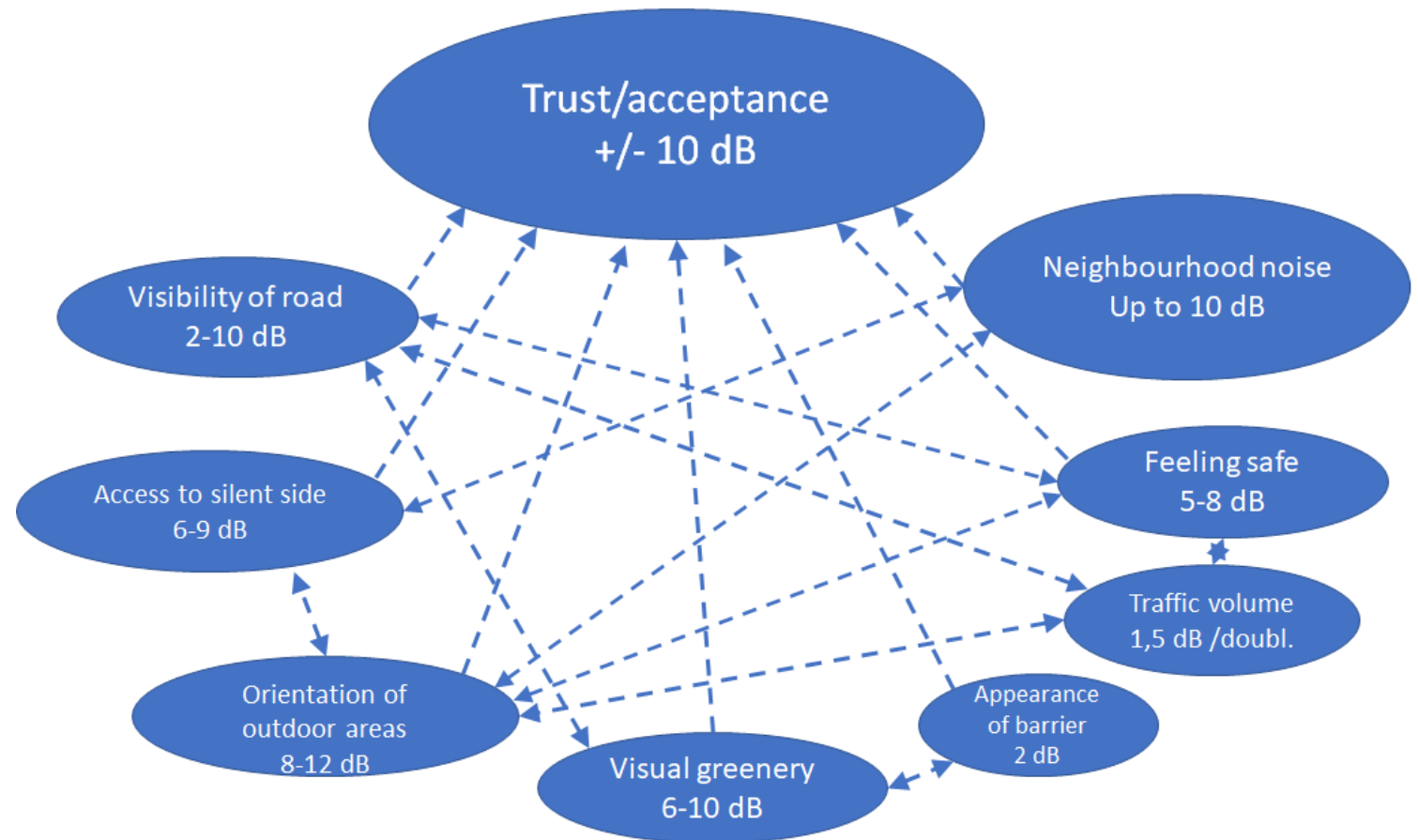


Summary



Dependencies and interactions exists

- **Effects not simply to combine!**
- Moderators with the highest effect should be considered first



Dependencies and interactions for illustration only
(Not based on modelling of interactions)

Example - Construction site noise

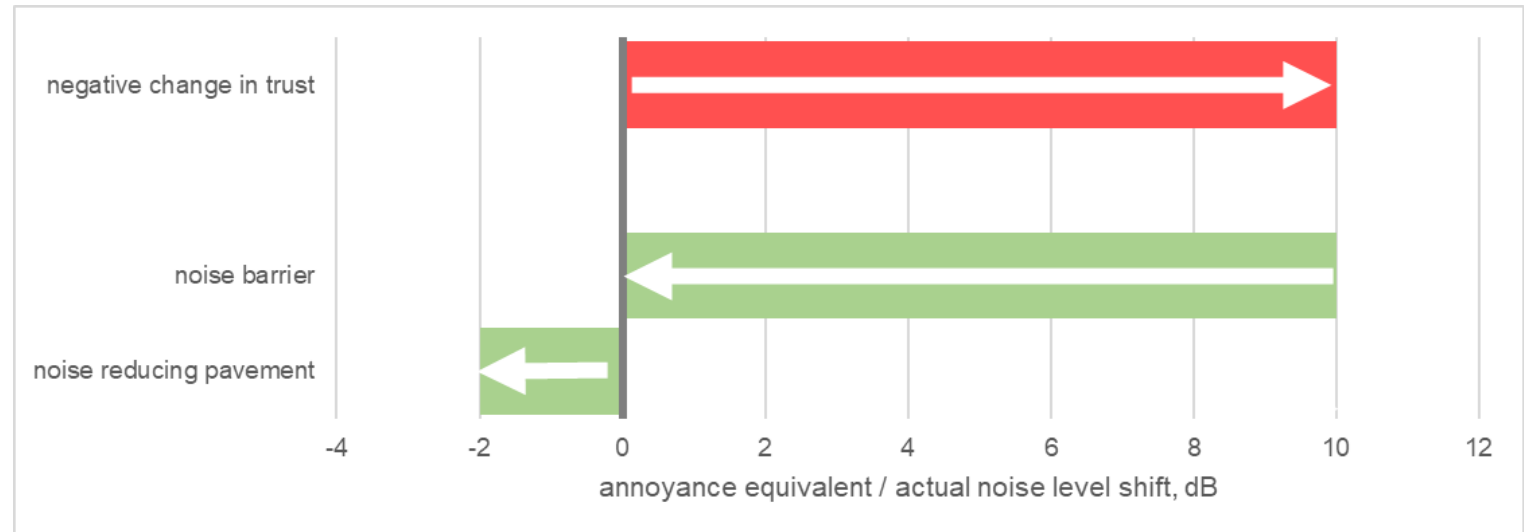
- Noise from the construction process
- Influences trust/acceptance
- **Tools:**
 - Involve citizens
 - Hotline for info and complains
 - Construction process noise abatement
 - Noise monitoring
 - Temporary noise barriers
 - See ON-AIR Guide Book by CEDR



Examples

Trust in authorities

- Influenced by many factors
- Could easily counteract benefits of noise barrier / noise-reducing pavement
- May change over time
- **Tools:**
 - Good public relations work
 - Good handling of complains



Examples

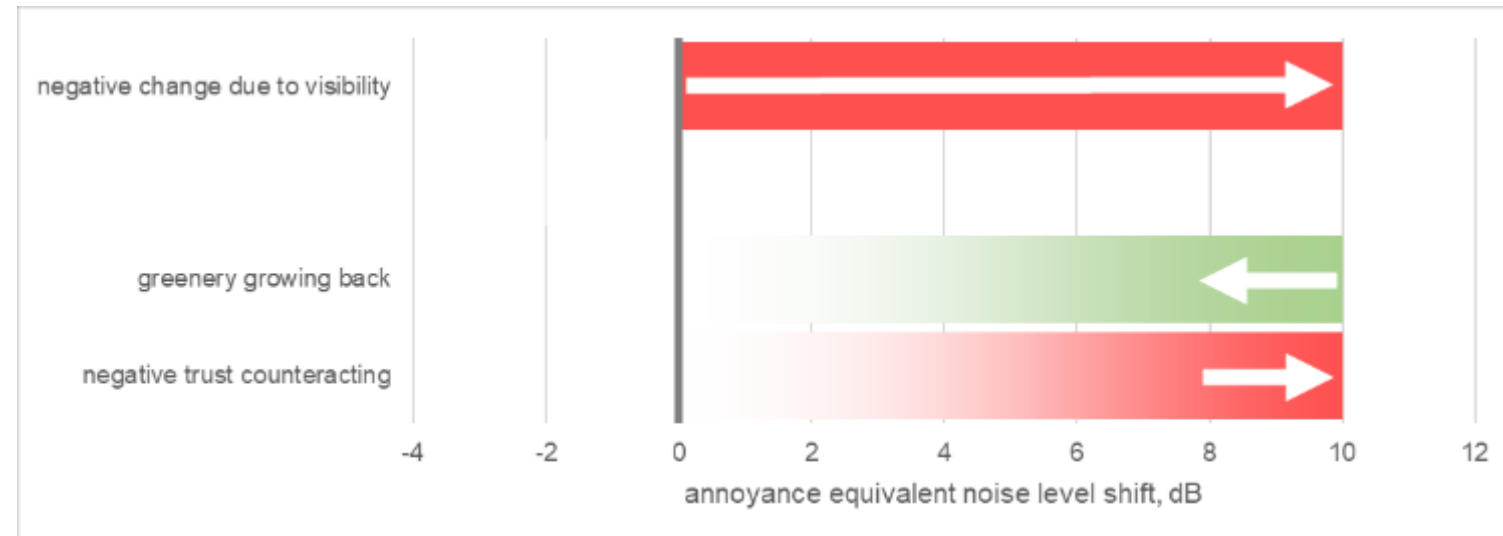
Visibility and greenery



Examples

Visibility and greenery

- Trimming and cutting of trees due to maintenance or construction
- **Tools:**
 - Announcements on work
 - Explanation:
 - Growing back
 - No acoustical effect



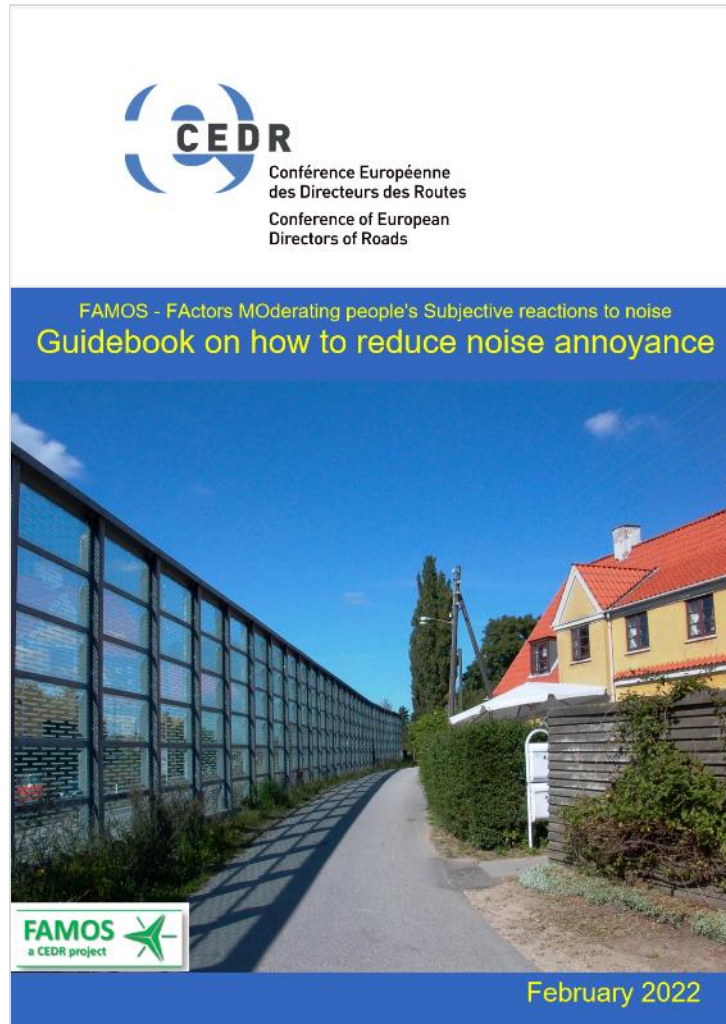
Outlook

- Based on the best knowledge of today and FAMOS modelling
- Modelling process described in project report and modelling report
- Update possible
- **Future noise surveys should include questions on the modifiers found in FAMOS**
- Methods investigated to improve data availability:
 - Mini surveys using questionnaires
 - Soundwalks in neighbourhoods
 - Listening tests performed in the laboratory



FAMOS Guidebook

See: <https://famos-study.eu/>



<https://www.cedr.eu/docs/view/6266a30cbec0f-en>

FAMOS Documentation



<https://www.cedr.eu/docs/view/6266a3574a04a-en>



Information and dissemination

- Info material:
 - Standard FAMOS presentation (on the homepage – soon)
 - Standard FAMOS article (short, medium and long on the homepage - soon)
- Can be used by CEDR for national presentations and articles
- Conference presentations:
 - Internoise 2021 in Washington
 - DAGA in 2022 in Stuttgart
 - Internoise 2022 in Glasgow
 - TRA 2022 in Lisbon

Thanks for listening!
Do you have any comments or questions?

