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Swiss Federal Office for the Environment
Noise Abatement Division

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Low-noise pavements for urban areas

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Gregor Schguanin

Swiss Federal Office for the Environment
Noise abatement division
CH - 3003 Berne

E-Mail: gregor.schguanin@bafu.admin.ch

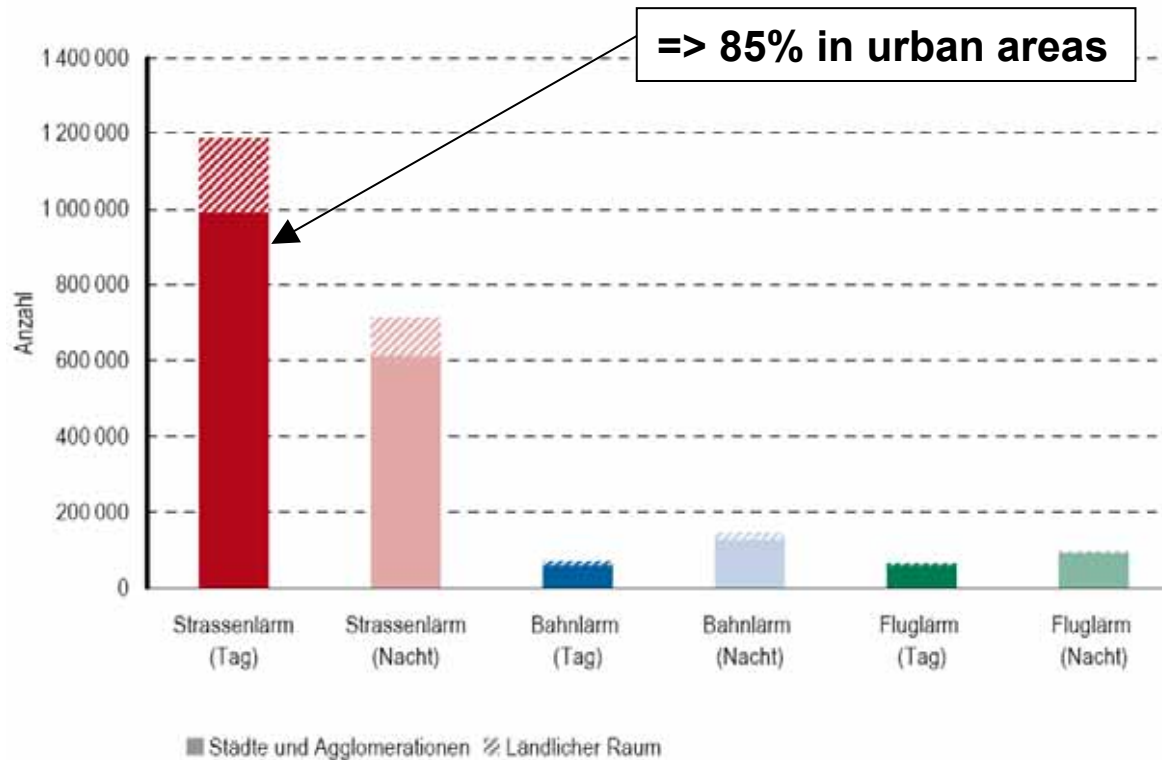


Noise nuisance in Switzerland

Noise is one of the major environmental problems (economically & health)

1.3 Mio. persons > IGW in total

1.2 Mio. persons > IGW road traffic (16% of population)





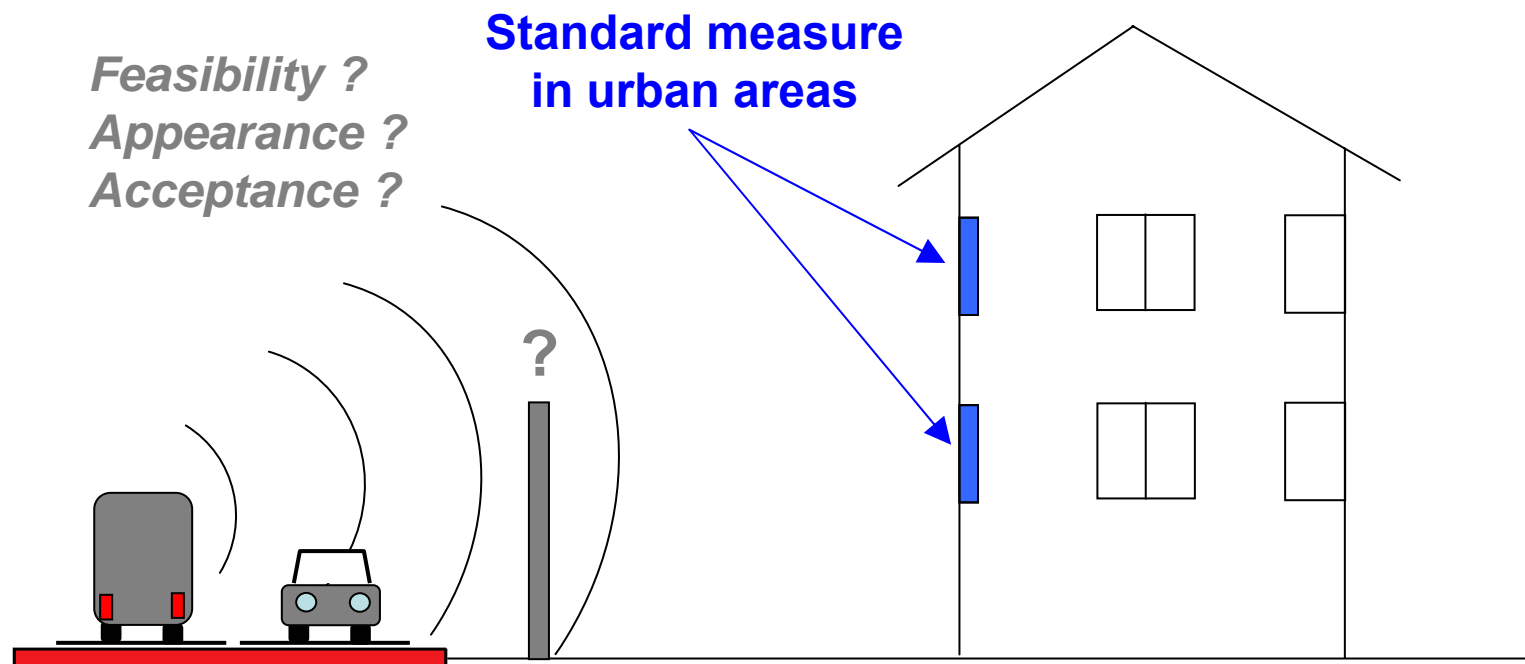
Noise improvement measures

Noise barriers

Sound proof windows

Noise reducing pavements

Other measures (v_{red} , traffic management, ...)



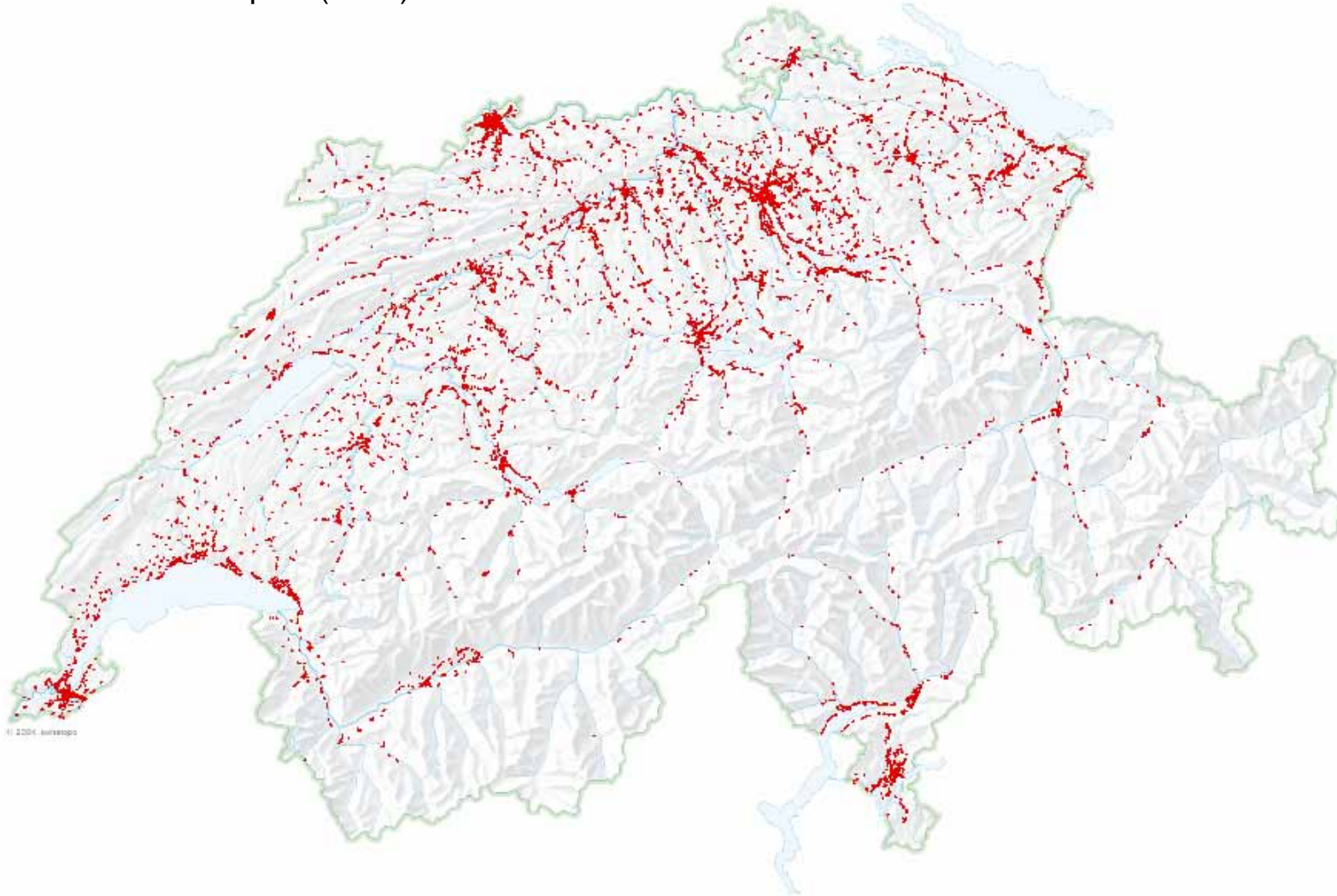


The challenge

1.2 Mio. Pers. > IGW
costs of improvement : 1.33 Mia. *
External costs: 1.16 Bio. p.a.

Traffic noise impact (2009)

Costs in CHF
* estimated remaining projects



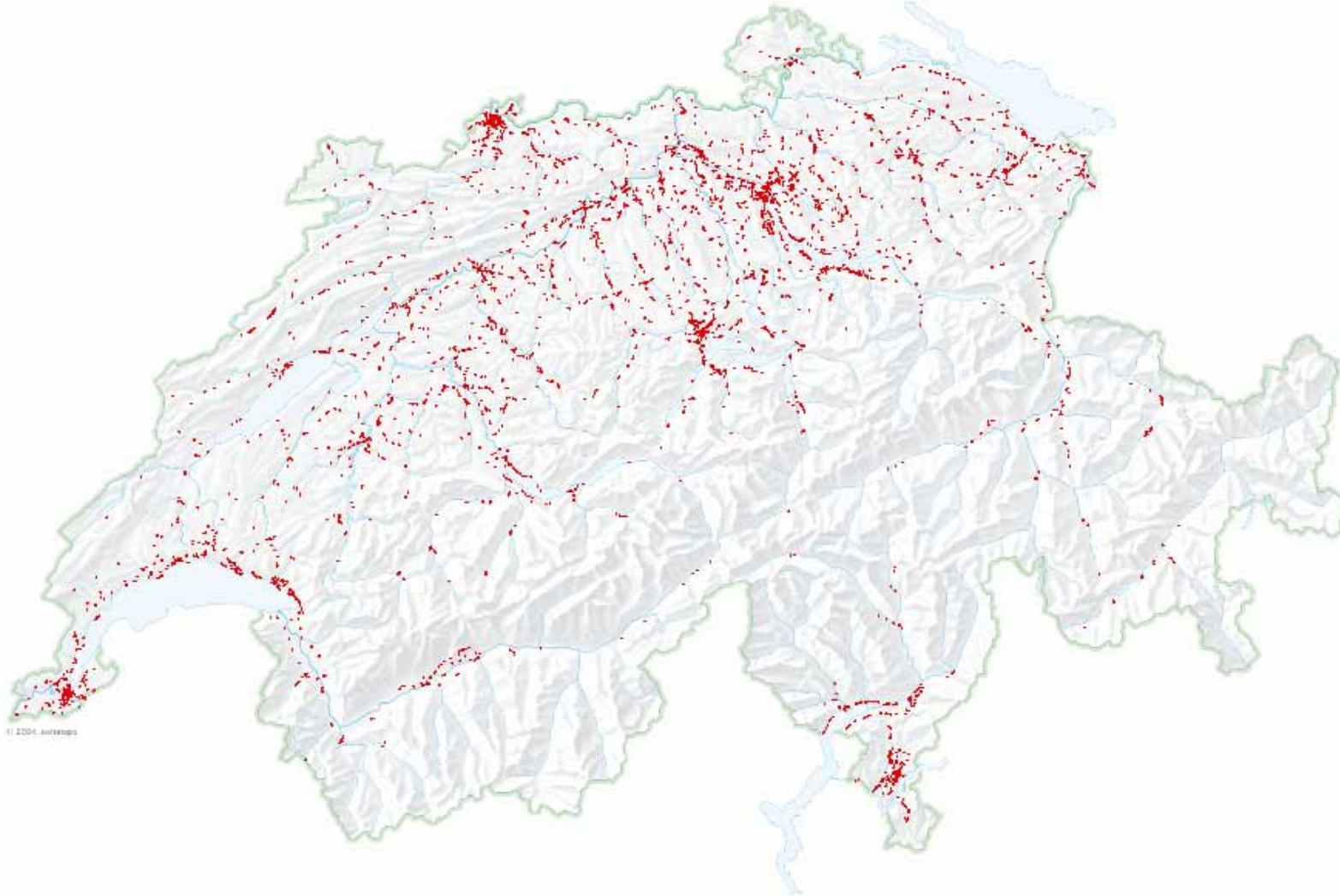
© 2004, Junfermann



The aim: 50 % reduction

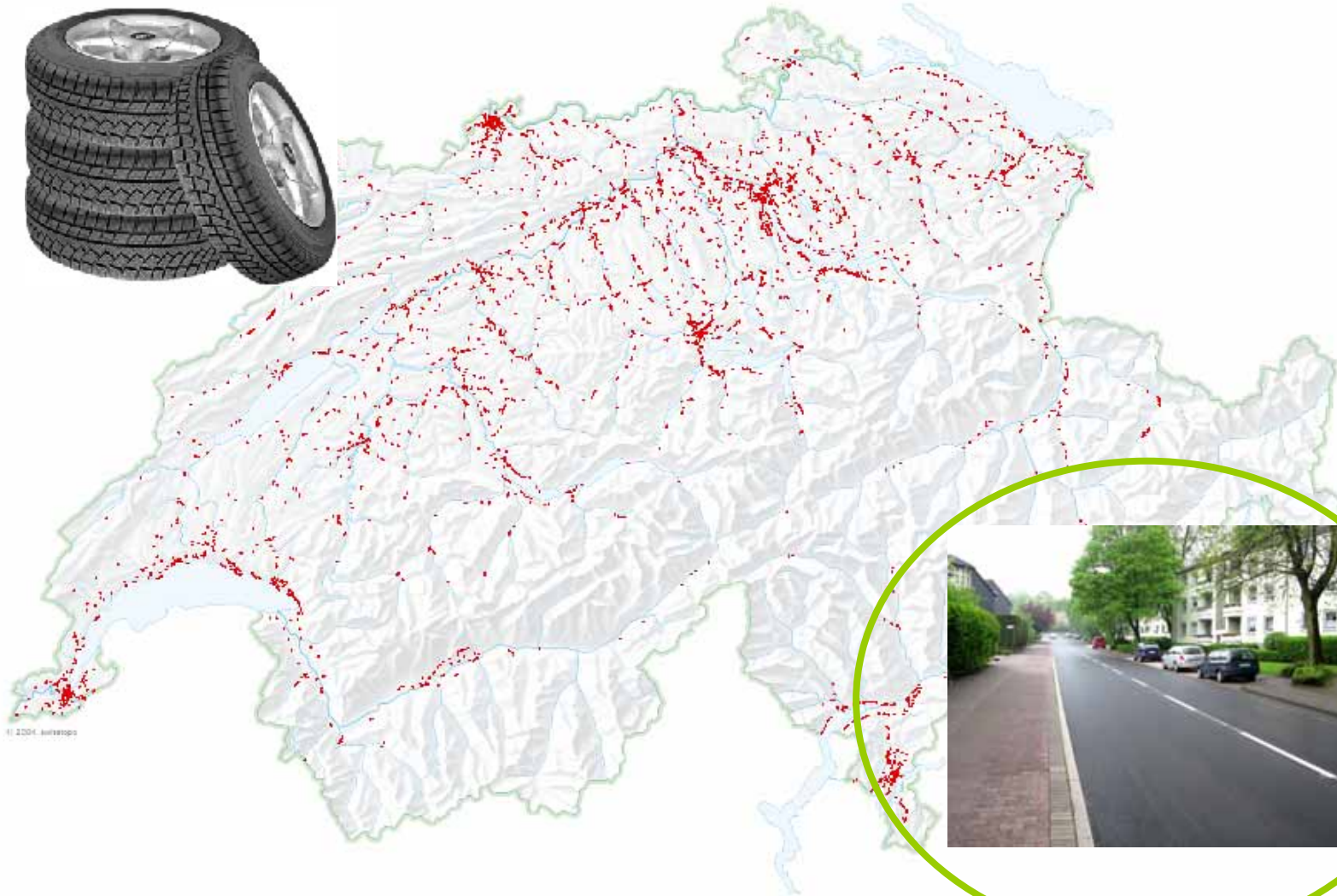
0.6 Mio. Pers. > IGW
costs of improvement: 0.67 Mia.*
External costs: 0.58 Bio. p.a.

Costs in CHF
* estimated remaining projects





The way to go: - 3 dBA through low-noise technology



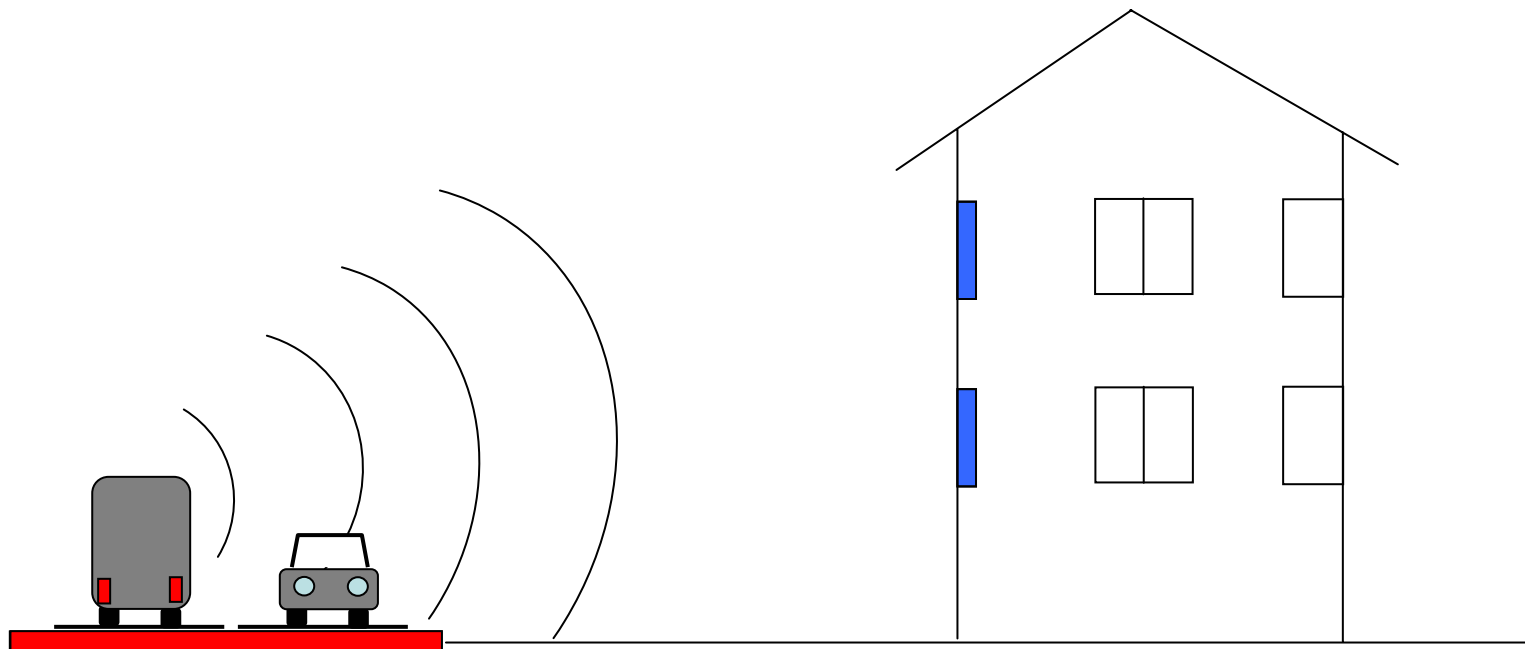


Remaining tasks for GRB...

...quieter vehicles

...quieter tyres

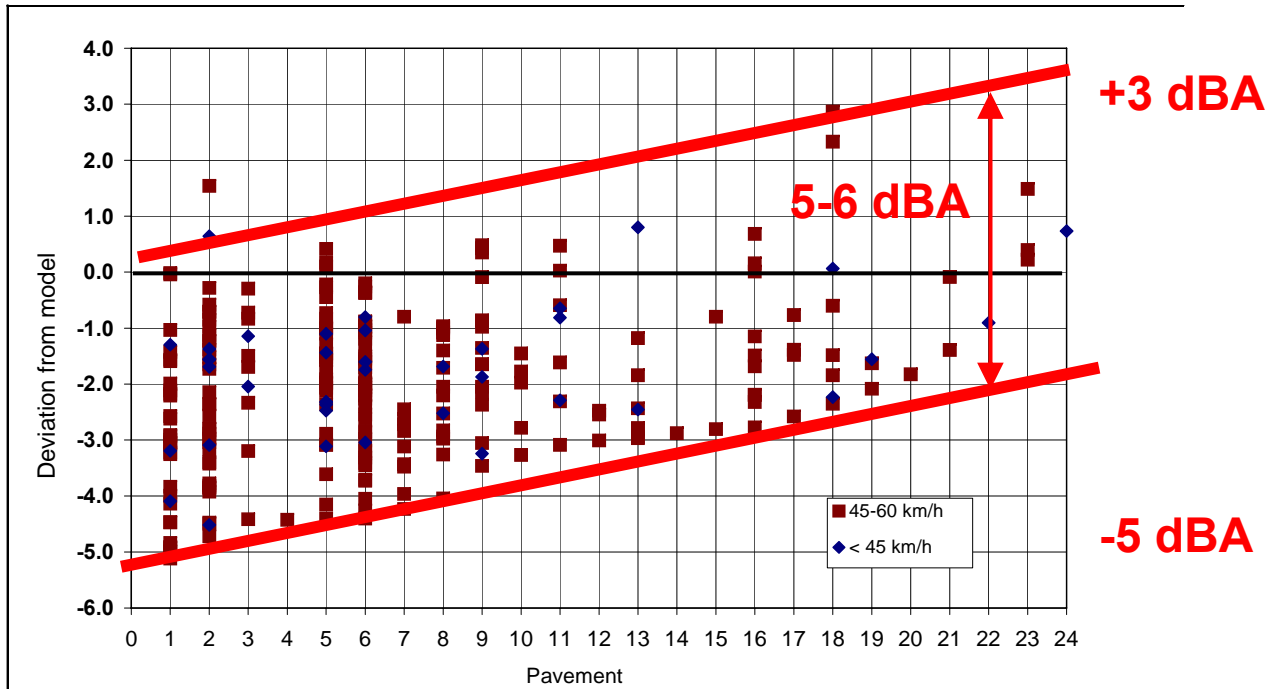
=> by establishing *effective regulations!*



Polluter pays-principle ??



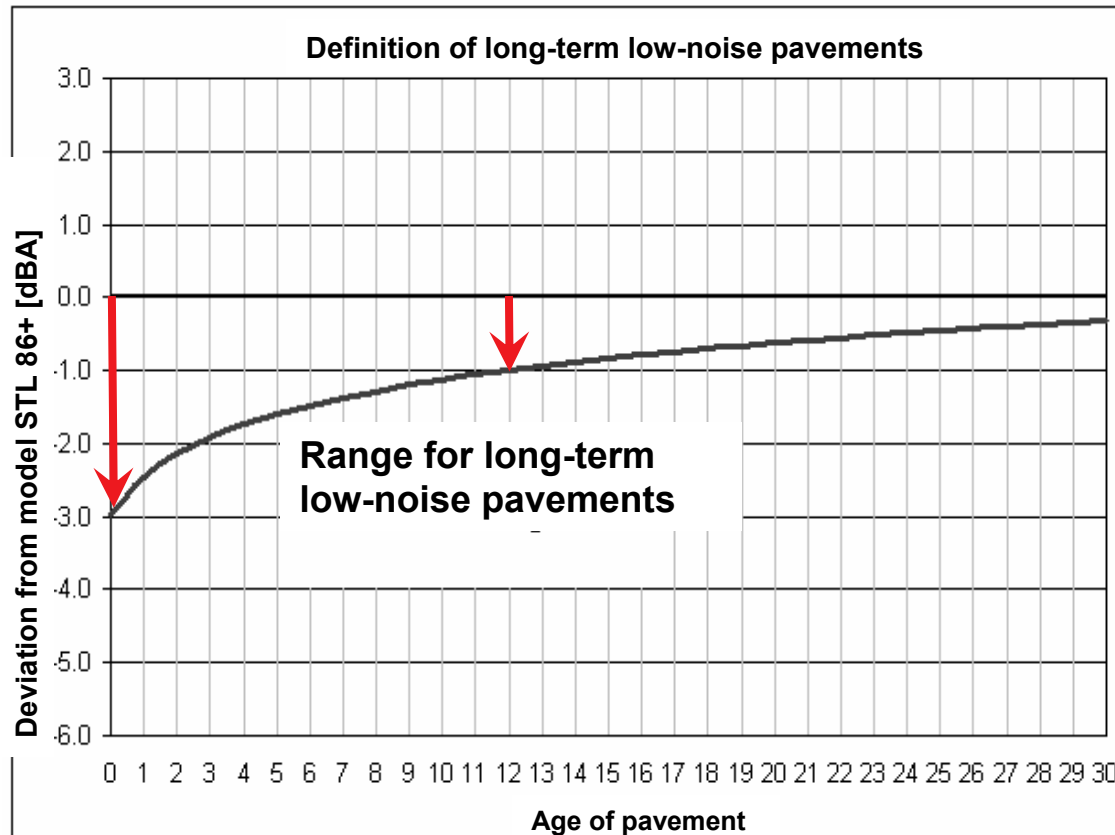
Spread of acoustic pavement quality urban



1 SPA6	6 SMA8	11 TA16	16 TA10	21 OB 6/11
2 SPA8	7 Monok. 6	12 SMA10	17 OB	22 MR8
3 SPA11	8 AB11	13 SMA6	18 AB16	23 Beton Concrete
4 MR6	9 AB10	14 HMT16	19 MR11	24 PflasterCobbles
5 SMA11	10 GA	15 OB 3/6	20 OB6/10	



Long-term behaviour of an urban low-noise pavement



Goals:

- Initial noise reduction $\geq 3\text{dBA}$
- Acoustic lifetime of -1 dBA over ≥ 12 years



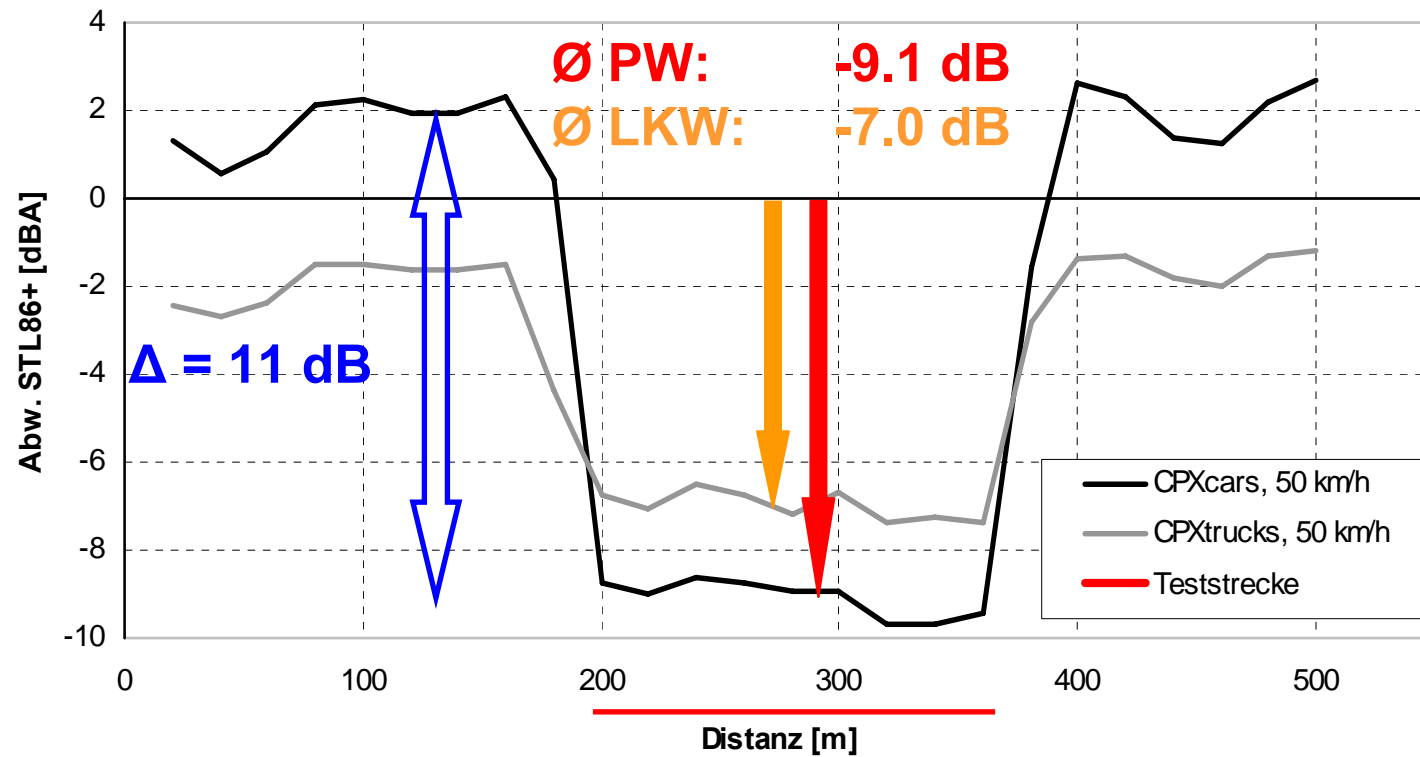
Nanosoft test-track in Geneva

- **NANOSOFT by COLAS** is hot asphalt concrete for application in thin or very thin wearing courses designed to provide a sharp reduction of vehicle noise.
- The trials in place show spectacular results: **- 9 dB(A)**, i.e., noise power is divided by 8.
- Nanosoft noise reduction performance is long-lasting thanks to a convoluted network of **micro air voids that reduce clogging**. Its mechanical performance levels are equivalent to those of an asphalt concrete in the same category (*> to be verified!*)
- Nanosoft's special grading curve provides **excellent skid-resistance**, thus improving safety for neighboring residents and users.
- NANOSOFT, with a **0/4 mm grading curve**, includes a high proportion of small aggregates bound together by Colflex elastomer modified bitumen binder.
- Noise absorption is optimal in **thicknesses ranging from 25 and 40 mm**.
- It offers excellent rut resistance, even in thin courses.
- NANOSOFT is designed for the construction and renovation of all types of roadways, regardless of traffic levels. It is particularly well suited for city streets and urban freeways.
- It is visually-appealing and provides surface drainability that helps reduce tire water spray in rainy weather.



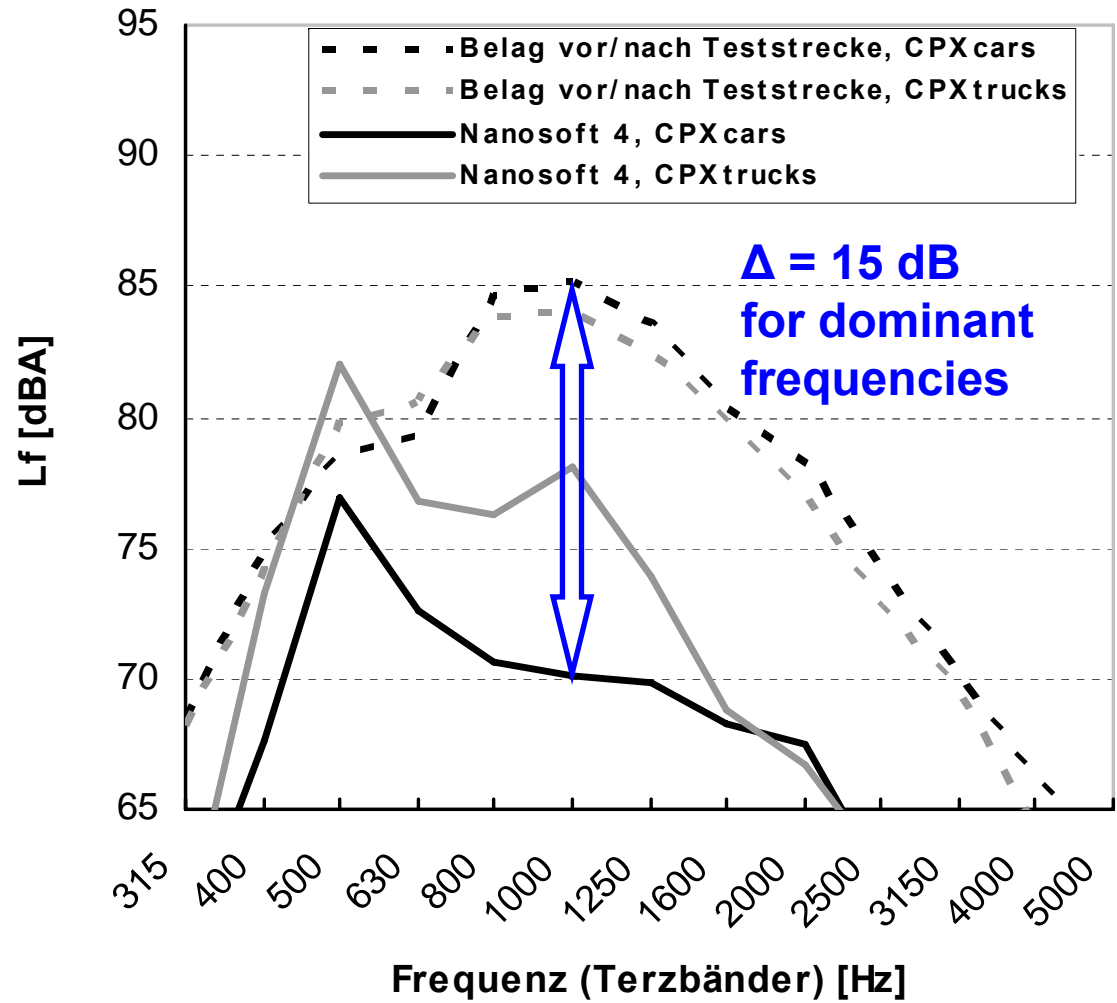
CPX-Results

Test track Nanosoft 4 Plan-les-Ouates, driving lane south





CPX-Frequency-Analysis





Further aspects



- Compliance with standards
- Contracts specifications & guarantees
- Static behaviour
- Grip
- Safety
- Drainage capacity
- Abrasivity
- Max. lifecycle
- Min. costs
- Min. maintenance
- Maintenance during winter period
- Repairability
- Recycling aspects

...

... and ***noise reducing***



=> Success through cooperation !



The next steps....

- > broad practical application
- > applied research
- > improved long-term behaviour

Thank you for your attention!



Do not defrost. Remove fish fingers from packaging and fry on all sides for 5-7 minutes.



Links

- Swiss noise abatement ordinance:
<http://www.bafu.admin.ch/laerm/01148/index.html?lang=en>
- FOEN website BAFU – Noise Abatement Division:
<http://www.bafu.admin.ch/laerm/index.html?lang=en>
- Road Noise guidelines (D/F) Pavement acoustics > Annex 1
<http://www.bafu.admin.ch/laerm/01148/03448/index.html?lang=de>
- Swiss research project, low-noise urban pavements:
Final report 2007 (D/F):
<http://www.bafu.admin.ch/publikationen/publikation/00702/index.html?lang=de>

Final report 2007 - condensed version (D/F/E):
<http://www.bafu.admin.ch/publikationen/publikation/00704/index.html?lang=en>