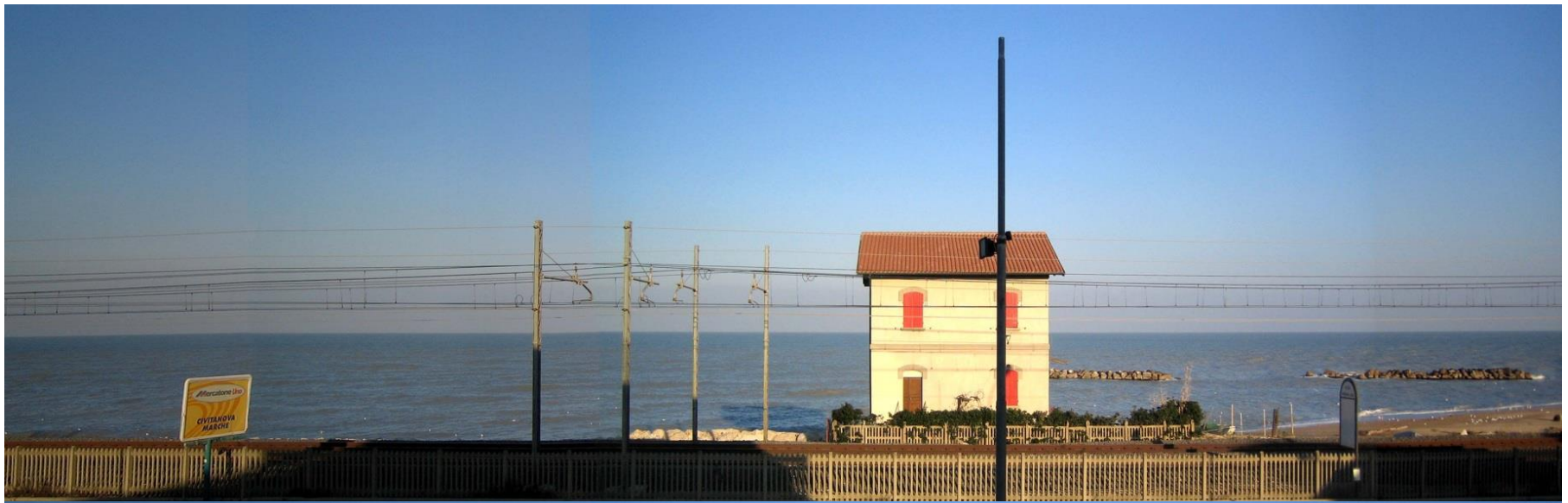


*Adam de Coster – title: card players – 1620*



*What' s a meaning for sustainability ?  
The game isn't worth the candle !*



***SUSTAINABLE APPROACH ?  
The game isn't worth the candle !***



# Sustainability assessment for road equipments: Noise & safety barriers case

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Giovanni Brero

ENBF President [www.enbf.org](http://www.enbf.org)



## ENBF Effective Members

Asociación Nacional de Industriales de Pantallas y dispositivos Anti-ruido (ANIPAR), Spain + Portugal

Association Professionnelle des Réalisateurs d'Ecrans Acoustiques (APREA), France

Deutscher Verband für Lärmschutz an Verkehrswegen e.V. (DVLV), Germany

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AKRIPOL d. o. o. , Slovenia

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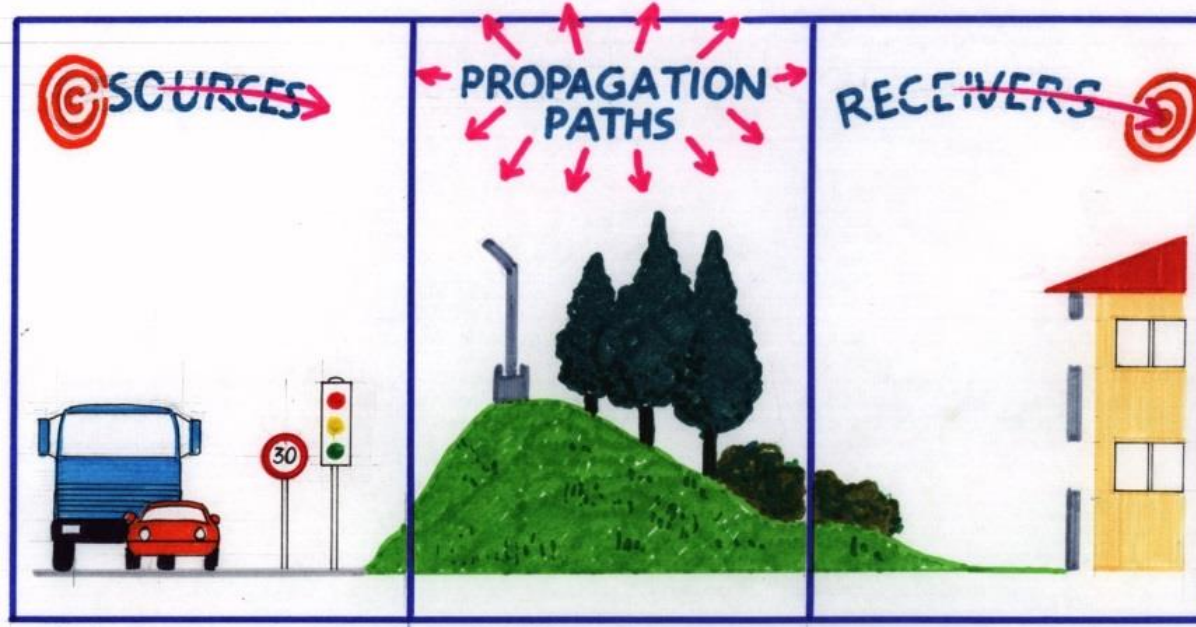
MICE SA, Belgium

Van Campen Industries B.V, The Netherlands

## ENBF goals

- To exchange knowledge and expertise on products and solutions among members of the Federation;
- To provide informative support and cooperation to the bodies in charge of writing European legislation and European technical standards;
- To set up the basis for cooperation between industry, public administration and other relevant stakeholders;
- To develop communication tools in order to spread knowledge and expertise to a large audience.

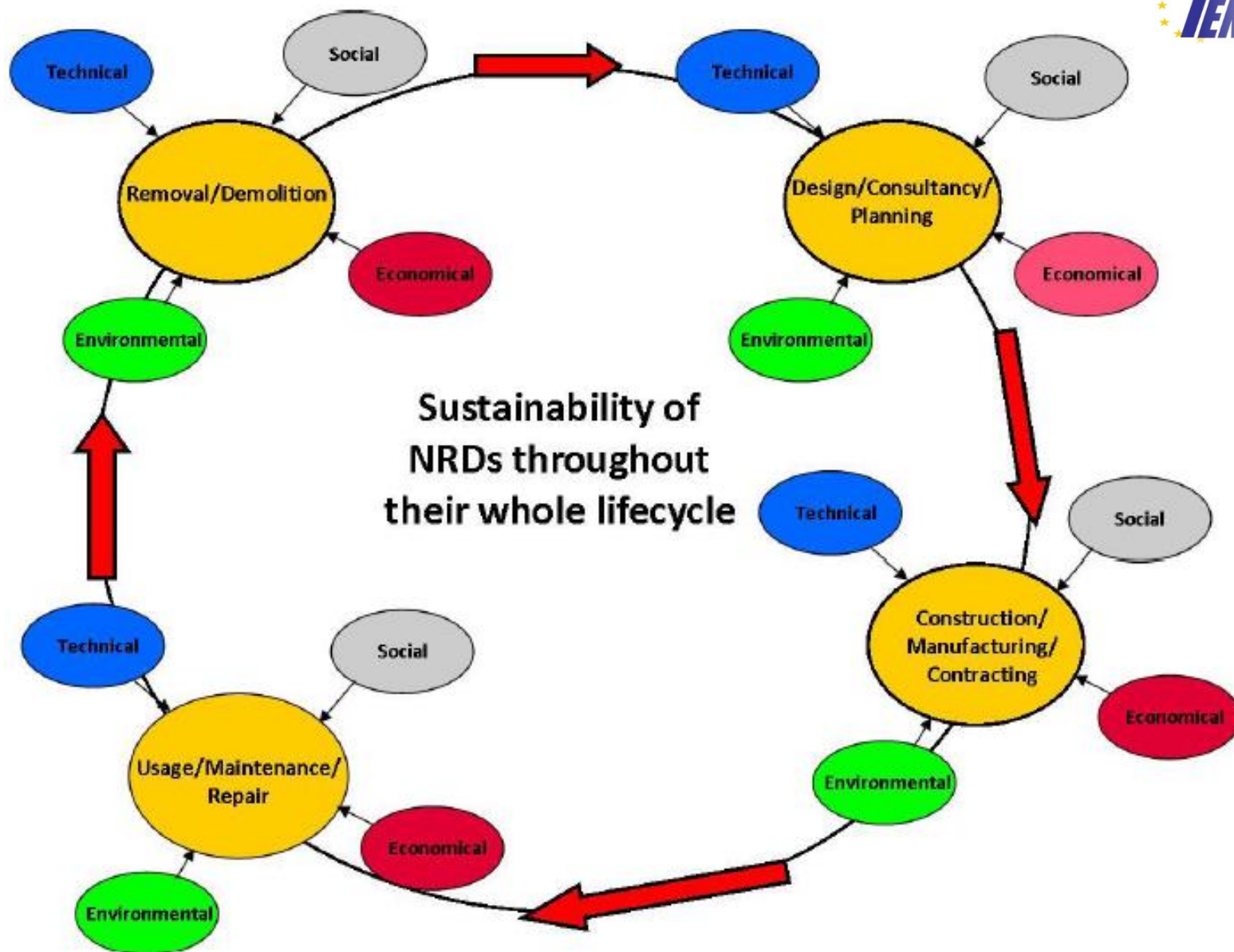
# Road / Rail Traffic Noise Reduction – actions to be taken: a sustainable approach



- Source porous asphalt :expected reduction up to 4 dB(A) for all receivers
- Receivers sound insulating windows  
expected reduction up to 15 dB(A) inside the buildings
- Propagation noise barrier / coverings  
expected reduction up to 15 dB(A) for noise barriers  
more than 20 dB(A) with coverings



**Cost can't be the unique criteria for contractor selection**





# Specially developed for noise barrier- see [www.quiesst.org](http://www.quiesst.org)

## Multi Criteria Analysis (MCA) for Sustainability Assessment

### TECHNICAL CRITERIA

<b>Material selection</b>	-	T
Glare of materials	Qualitative	T
Use of recycled materials	Quantitative	T
Local materials	Quantitative	T
<b>Acoustic performances</b>	-	T
Sound insulation of the NRD	Quantitative	T
Sound absorption of the NRD	Quantitative	T
Insertion loss	Quantitative	T
<b>Service life</b>	-	T
Structural elements service life	Quantitative	T
Acoustic elements service life	Quantitative	T
<b>Maintenance requirements</b>	-	T
Impact of maintenance task	Qualitative	T
Maintenance frequency	Quantitative	T
<b>Buildability/constructability/removability</b>	-	T
Intrinsic <u>buildability/constructability</u>	Qualitative/ Quantitative	T
<u>Buildability/constructability</u> due to site specific	Qualitative/ Quantitative	T
Intrinsic <u>removability</u> at the end of life	Qualitative/ Quantitative	T
<u>Removability</u> at the end of life due to site specific	Qualitative/ Quantitative	T
<b>Ability to change existing noise barrier as required</b>	Qualitative	T
<b>Use of crash/safety barriers for road users</b>	Qualitative	T

**Specially developed for noise barrier- see [www.quiesst.org](http://www.quiesst.org)  
Multi Criteria Analysis (MCA) for Sustainability Assessment  
ECONOMICAL CRITERIA**

<b>Life cycle cost</b>	-	EC
Capital costs	-	EC
Cost of land	Quantitative	EC
Design costs including consultants	Quantitative	EC
Construction and transport cost	-	EC
Ex works cost	Quantitative	EC
Transport cost	Quantitative	EC
Labour cost	Quantitative	EC
Equipment hire cost	Quantitative	EC
In-situ civil works required by barrier type	Quantitative	EC
In-situ civil works required by site	Quantitative	EC
Maintenance cost	Quantitative	EC
Removal/demolition cost	Quantitative	EC
Income generation due to the noise barrier	Quantitative	EC
<b>Effect on local residential/commercial property prices</b>	Quantitative	EC
<b>Compensation cost</b>	Quantitative	EC
<b>Contractual and procurement type</b>	-	EC
Sustainable/green procurement	Qualitative	EC

# Specially developed for noise barrier- see [www.quiesst.org](http://www.quiesst.org)

## Multi Criteria Analysis (MCA) for Sustainability Assessment

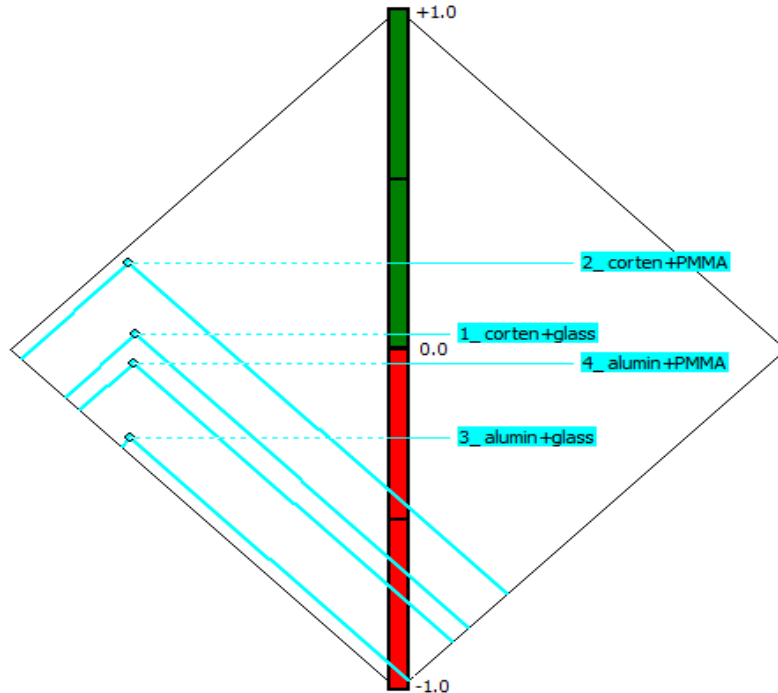
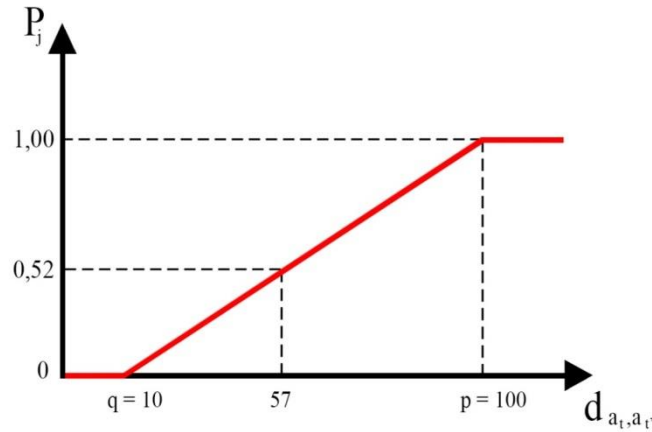
### SOCIAL CRITERIA

<b>Architectural design and visual impacts</b>	-	<b>S</b>
Landscape/cityscape	-	<b>S</b>
Cultural heritage	Qualitative	<b>S</b>
Landscape architecture	Qualitative	<b>S</b>
<u>Architectural design</u>	-	-
Architectural design of NRD type	Qualitative	<b>S</b>
Architectural design in local context	Qualitative	<b>S</b>
<b>Visual impacts</b>	-	<b>S</b>
Loss of view for residents and road users	Qualitative	<b>S</b>
Loss of daylight for residents and road users	Qualitative	<b>S</b>
Enclosure effects for residents and road users	Qualitative	<b>S</b>
Shading impacts for residents	Qualitative	<b>S</b>
More litter due to noise barrier's presence	Qualitative	<b>S</b>
<b>Community engagement</b>	-	<b>S</b>
Sense of neighbourhood ownership	-	<b>S</b>
Barrier design/type via public consultation	Qualitative/ Quantitative	<b>S</b>
Community art used on noise barrier	Qualitative	<b>S</b>
Local social identity enhancement	Qualitative/ Quantitative	<b>S</b>

Specially developed for noise barrier- see [www.quiesst.org](http://www.quiesst.org)  
**Multi Criteria Analysis (MCA) for Sustainability Assessment**  
**ENVIRONMENTAL CRITERIA**

<b>Air quality and climate change</b>	-	EN
Climate change	-	EN
Global warming potential (100y)	Quantitative	EN
Global warming potential due to transport	Quantitative	EN
<b>Air quality</b>	-	EN
Acidification potential	Quantitative	EN
Dust and particulate matter	Quantitative	EN
Materials that trap or deflect pollution	Qualitative	EN
Ozone layer destruction	Quantitative	EN
<b>Water</b>	-	EN
Water consumption	-	EN
Embodied water content	Quantitative	EN
<b>Water pollution</b>	-	EN
<u>Ecotoxicity for water</u>	Quantitative	EN
<b>Energy</b>	-	EN
Energy consumption	-	EN
Use of primary energy resources	Quantitative	EN
Use of primary energy resources for transport	Quantitative	EN
Renewable energy production	Quantitative	EN

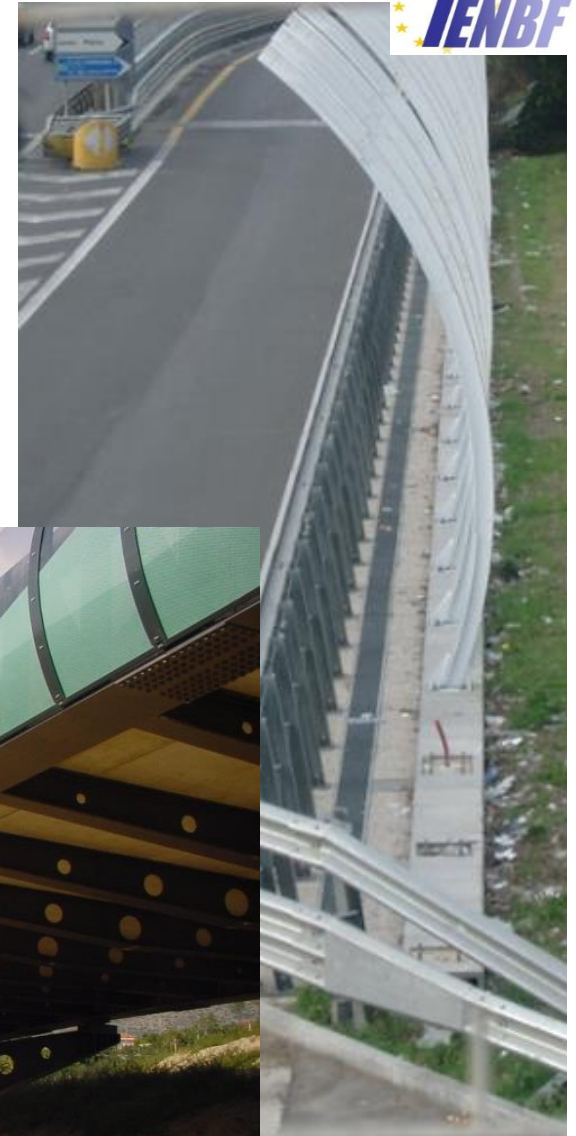
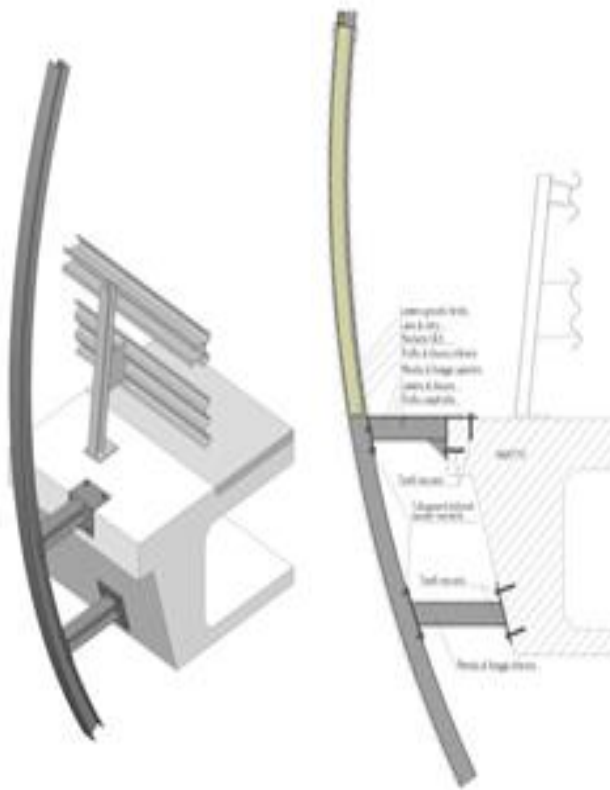
# Specially developed for noise barrier- see [www.quiesst.org](http://www.quiesst.org) Multi Criteria Analysis (MCA) for Sustainability Assessment



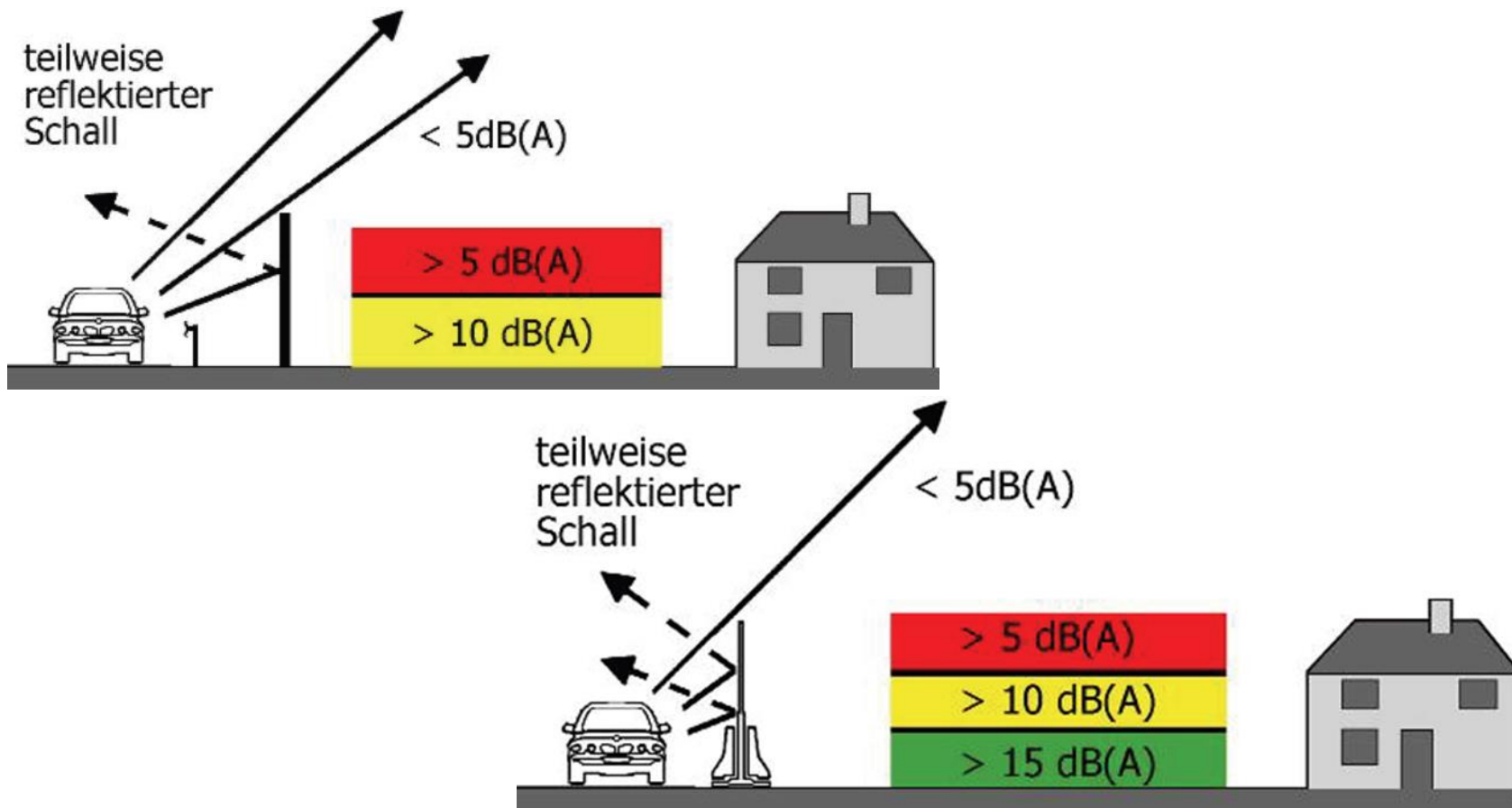
- To identify relevant criteria (over 100 identified)
- Methods used to generate informations (LCC, CO2 footprint)
- To select Quantitative / qualitative indicators
- To select measurement units
- Weighting/normalization criteria
- Select an appropriate Multi Criteria Decision Making (i.e. SAW, PROMETHEE, ELECTRE)
- To perform calculation

# SAFETY AND NOISE BARRIERS

Merging of two systems, advantage:  
Space and associated cost reduced on  
bridges



Merging of two systems, advantages:  
Improved acoustic performance



Note: pictures by Deltabloc website

## Case history: metallic integrated system





Case history: metallic integrated system in corten steel  
Folding top barrier for easy bridge maintenance





Case history: metallic integrated system

Trasparent sheets included

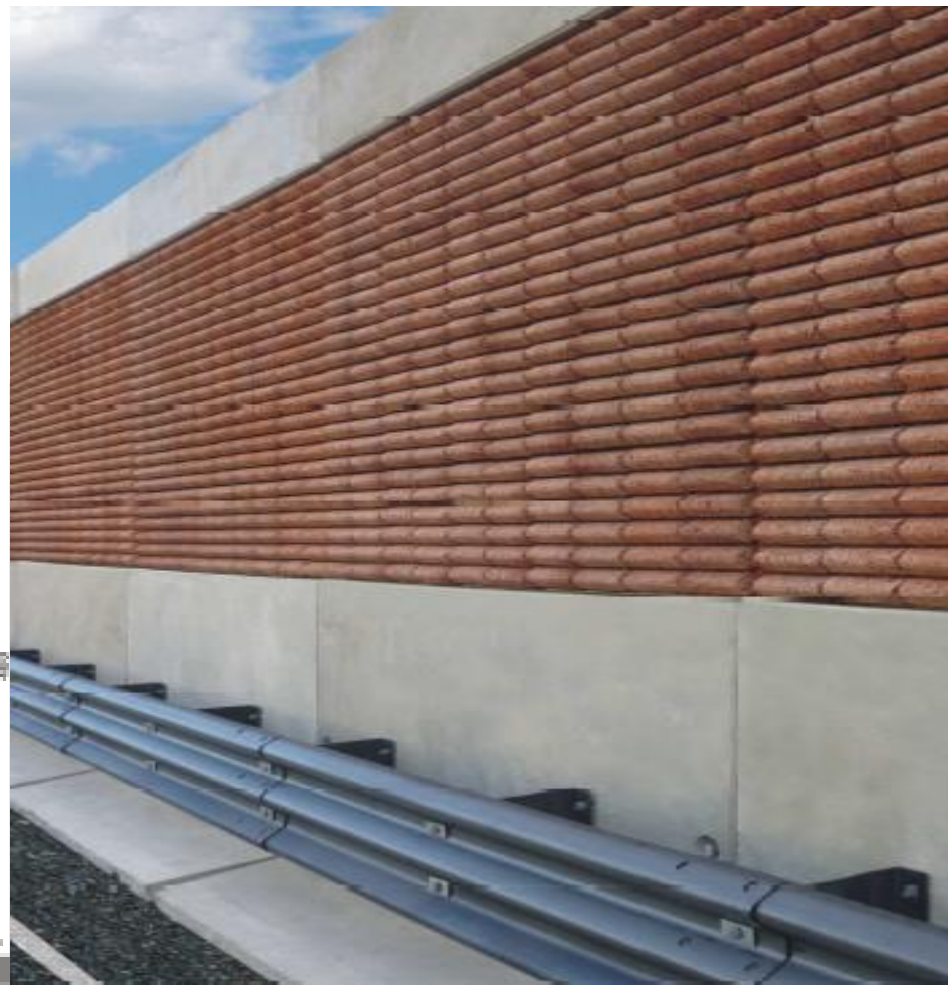
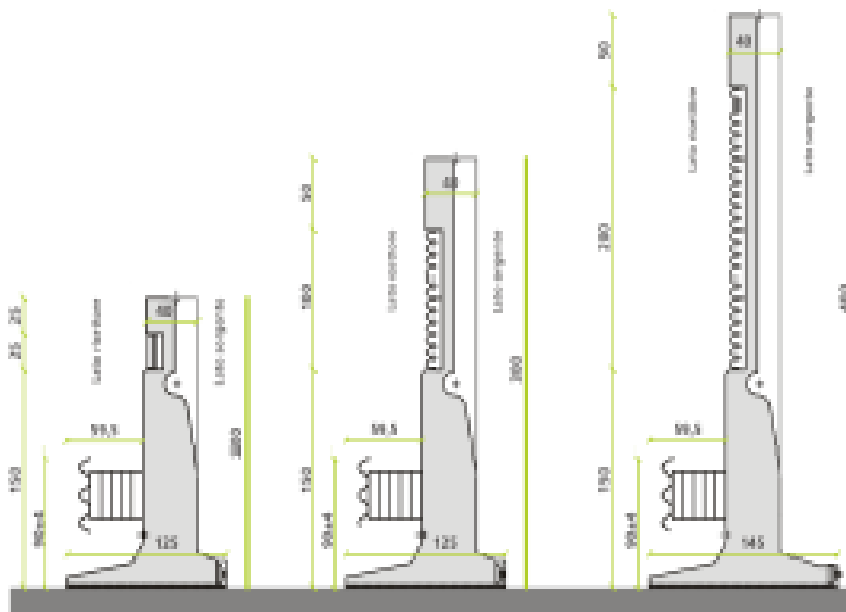


Case history: metallic integrated system  
New jersey shaped safety barrier  
Transparent element included



Case history:

Self standing concrete barrier  
+ guard rail profile



Case history:  
Fully concrete self standing barrier



## Other sustainable practices in noise barrier applications



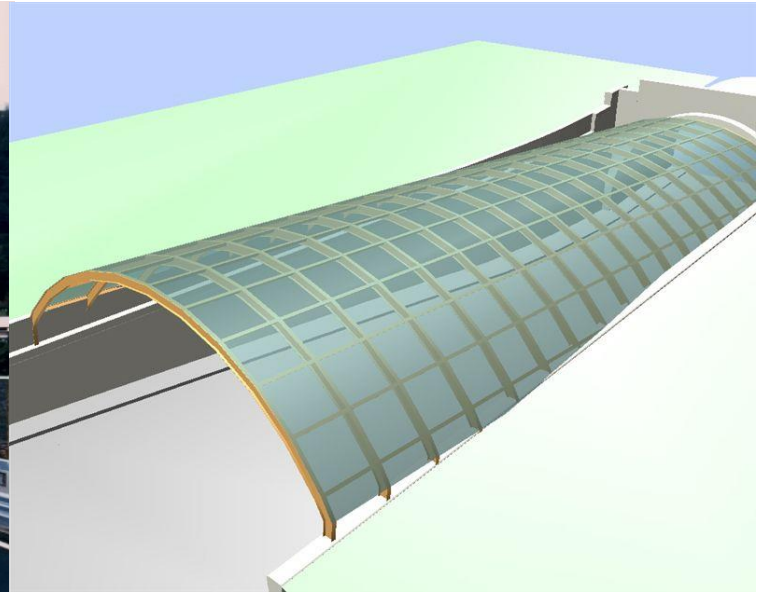
Noise barriers are almost always paid by public funding.

Are there possible income funds to cover costs ?

Noise barriers surface can be used for advertisement boards or photovoltaic modules.



## Other sustainable practices in noise barrier applications



**Artificial tunnel built for noise reduction for buildings closed to tunnel entrance to save energy used for internal tunnel lighting.**

# Thanks for your attention

for further info pls see:

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[c.durso@erf.be](mailto:c.durso@erf.be)

