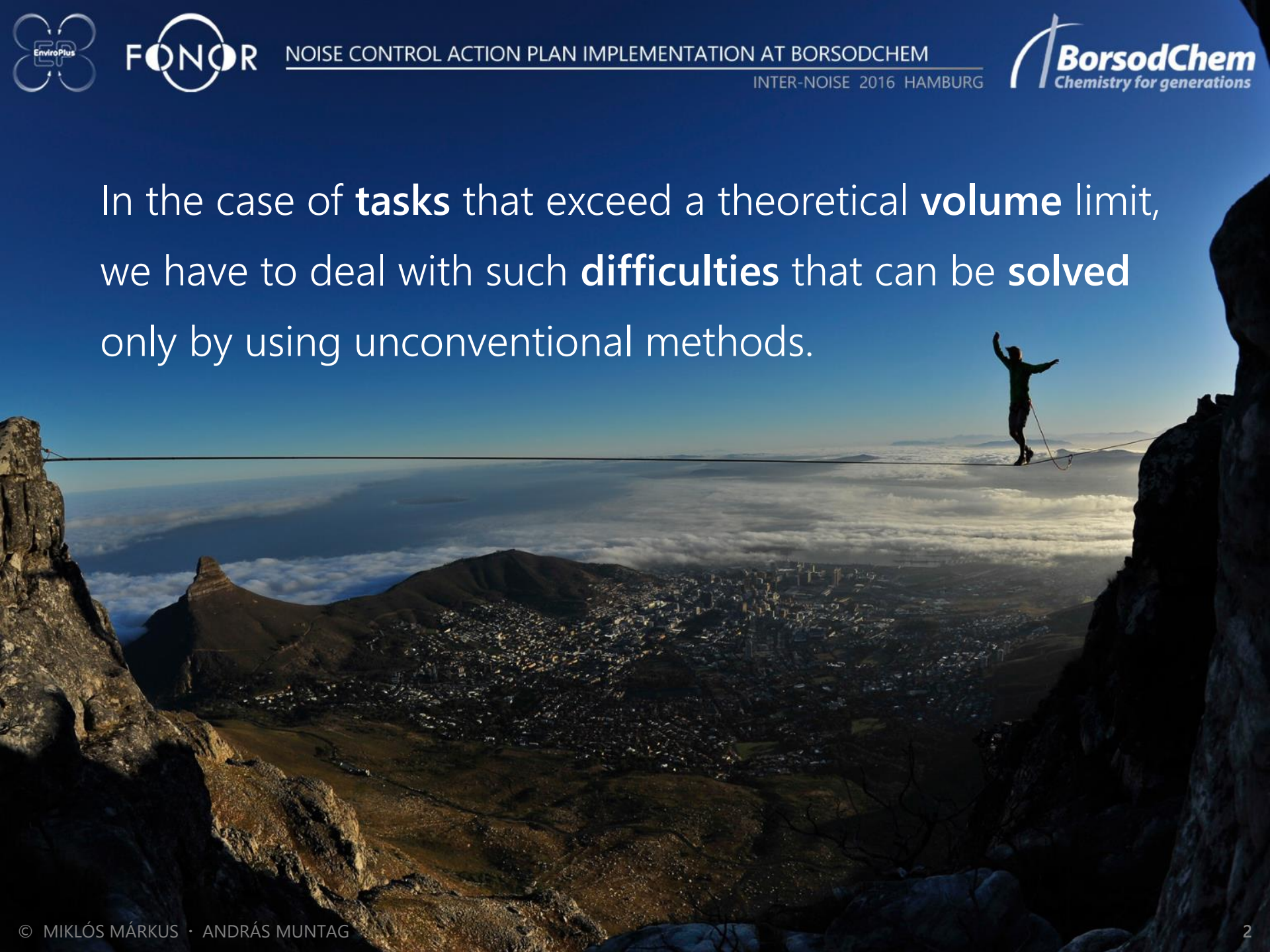


Miklós Márkus · András Muntag

**Noise Control Action Plan
Implementation at  BorsodChem 1/2**
Chemistry for generations



In the case of **tasks** that exceed a theoretical **volume** limit, we have to deal with such **difficulties** that can be **solved** only by using unconventional methods.



chapter 1

chapter 2

chapter 3

chapter 4

chapter 5

BORSODCHEM

THE VOLUME

THE TASK

THE DIFFICULTIES

THE SOLUTIONS



chapter 1

BORSODCHEM



1967

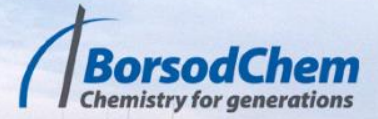




1954



2014





VOLUME

chapter 2

THE VOLUME



NOISE CONTROL ACTION PLAN IMPLEMENTATION AT BORSODCHEM

INTER-NOISE 2016 HAMBURG





4 km²



NOISE CONTROL ACTION PLAN IMPLEMENTATION AT BORSODCHEM

INTER-NOISE 2013, HAMBURG





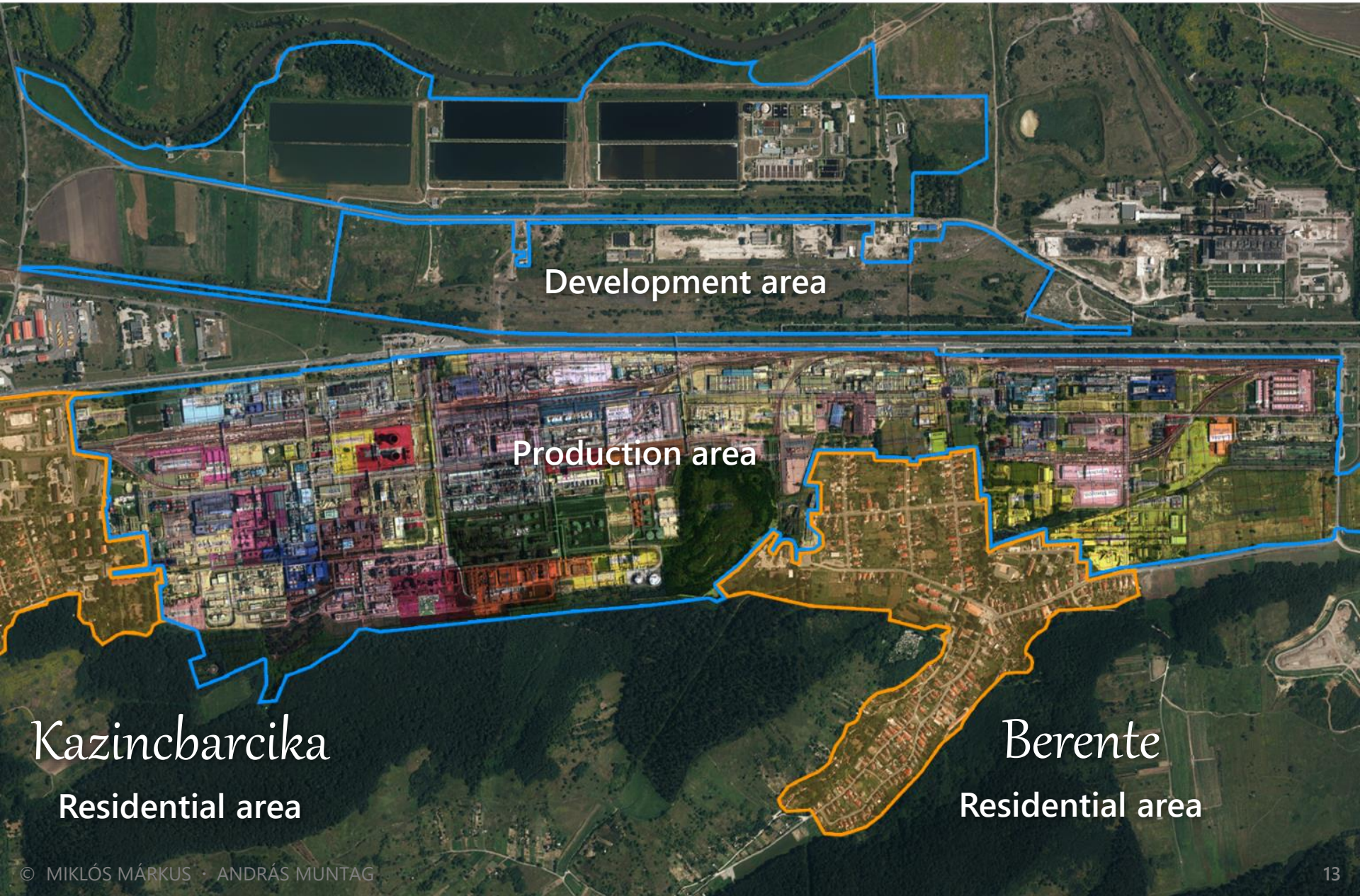
2,5 km²

more than **20** stand-alone facilities

which operates continuously **day & night**

with **1000** of individual noise sources





Development area

Production area

Kazincbarcika

Residential area

Berente

Residential area

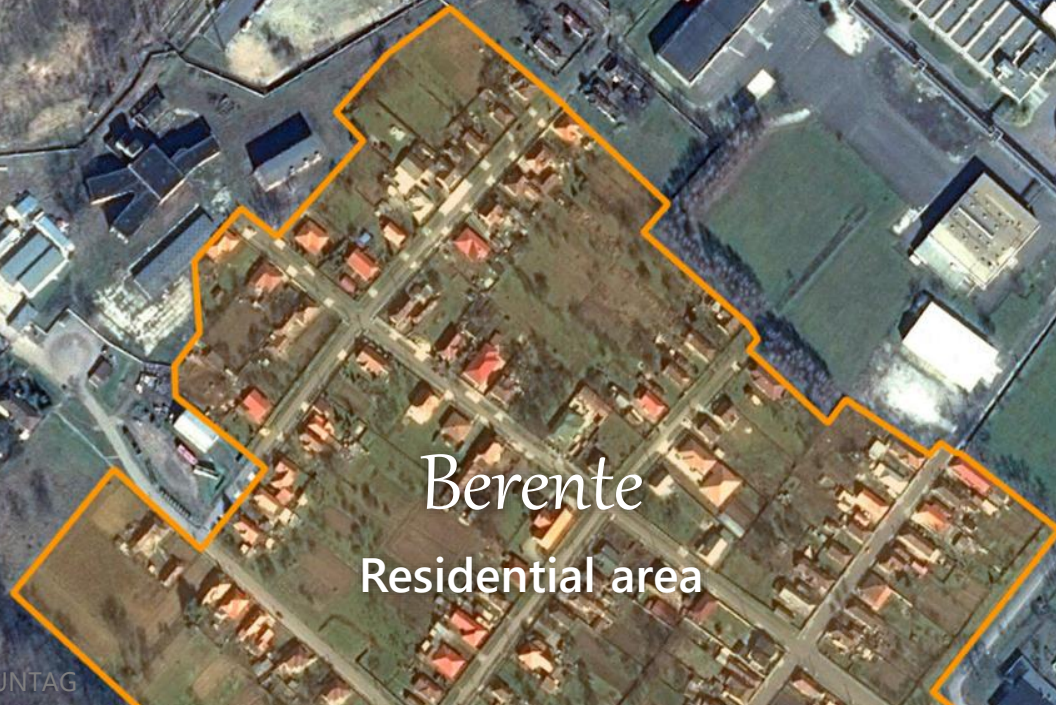


Kazincbarcika
Residential area

Production area



Production area



Berente
Residential area



chapter 3

THE TASK

the noise limit is

exceeded by 8 dB

in both residential areas



the environmental authority ordered the making of a

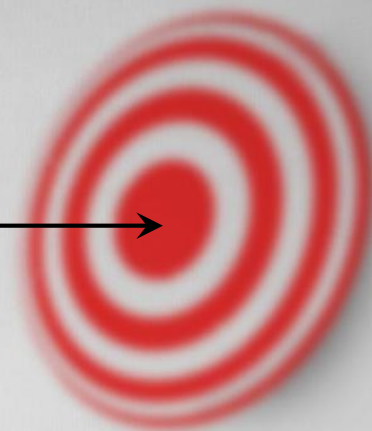
NOISE CONTROL ACTION PLAN

According to the **law**, the action plan must include:

- a) **measures** designed to reduce noise emission
- b) the expected **outcome** of the designed measures
- c) the **time** period required for the implementation



THE **AIM** OF THE TASK



- analyse the noise sources in **detail**,
- identify the noise sources causing the **exceedance**,
- determine **their roles** played in the exceedance,
- establish the order of the noise sources according to their **dominance**,
- clearly identify those noise sources which **do not play a role**,
- identify the **priorities** of noise reduction,
- determine the **noise reduction need**,
- explore the **technical noise reduction options**,
- carry out the **acoustic design** of the solutions,
- demonstrate the **expected noise condition**.





chapter 4

THE DIFFICULTIES

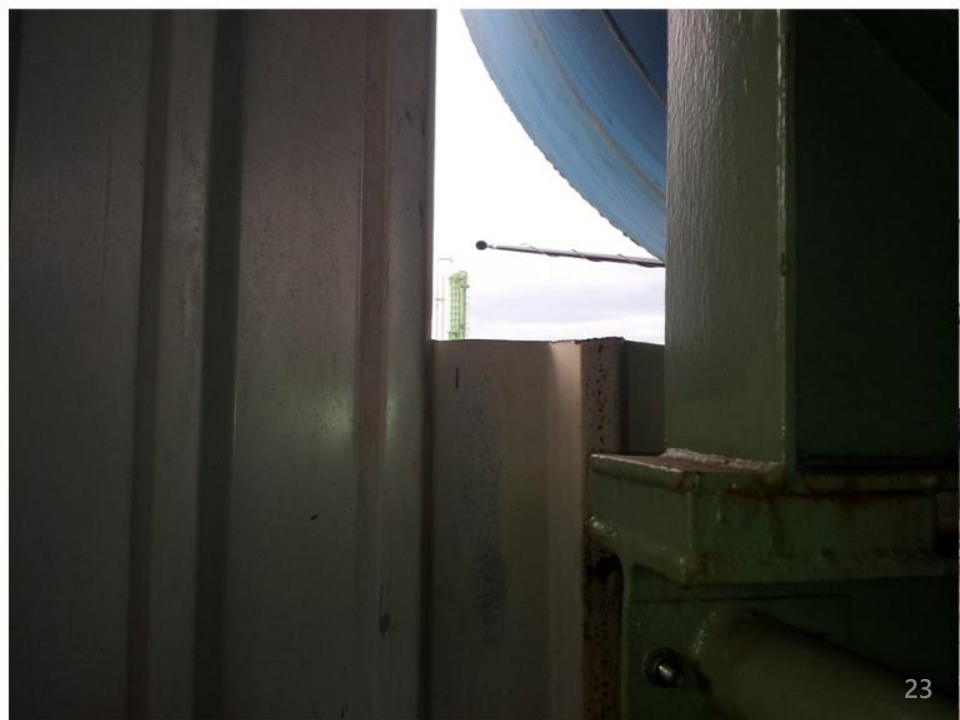


thousands of different noise sources

TOO MANY NOISE SOURCES



dominant noise source
33 m high







FONQ

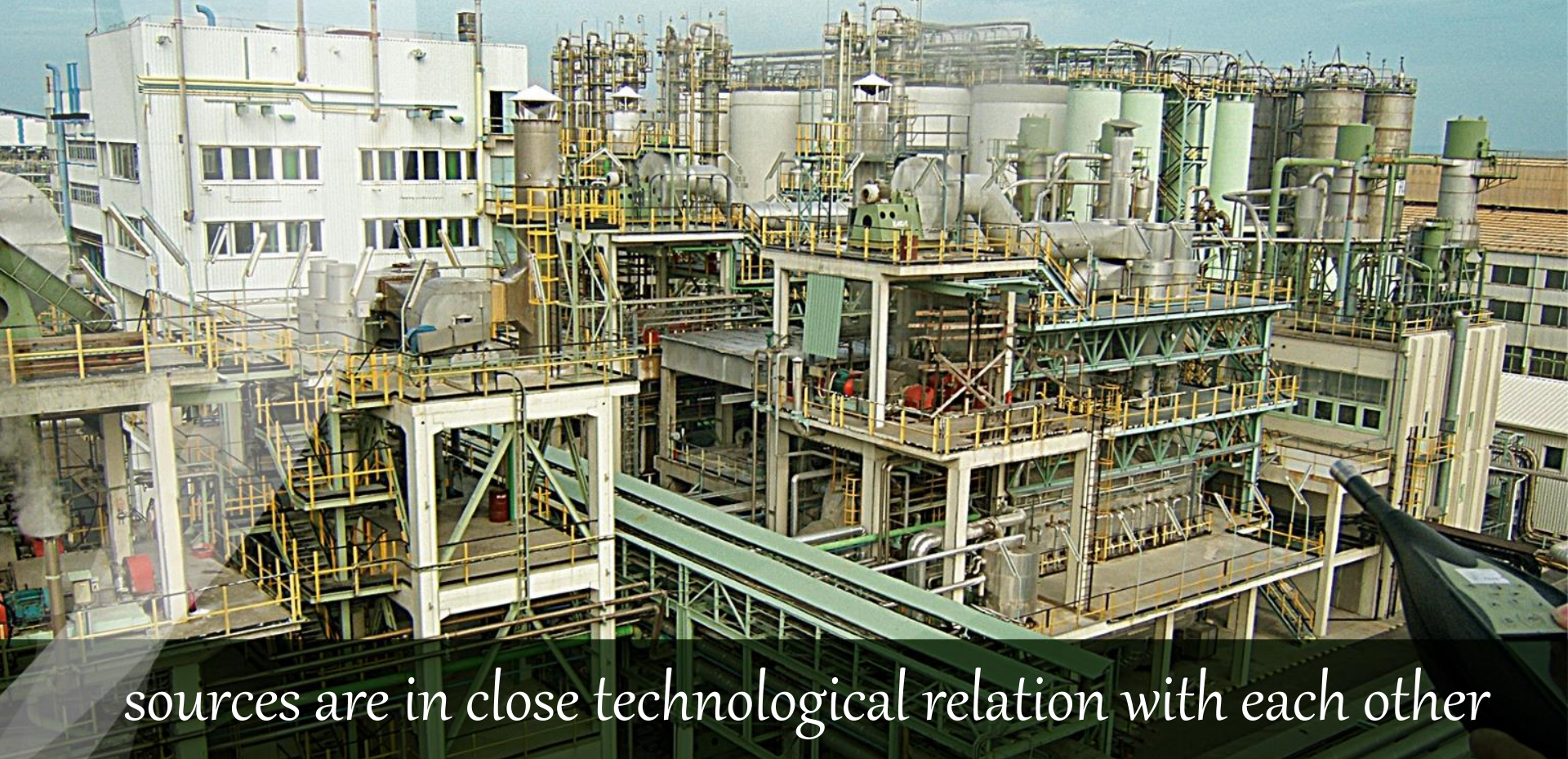
CONTROL ACTION PLAN IMPLEMENTATION AT BORSODCHEM

INTER-NOISE 2016 HAMBURG



at
a
Girl Wants...





sources are in close technological relation with each other

CANNOT BE MEASURED SELECTIVELY

Table 4 — Estimates of the sound reflection coefficient ρ

Object	ρ
Flat hard walls	1
Walls of building with windows and small additions or bay	0,8
Factory walls with 50 % of the surface consisting of openings, installations or pipes	0,4
Cylinders with hard surfaces (tanks, silos)	$\frac{D \sin(\phi/2) *)}{2d_{sc}}$
Open installations (pipes, towers, etc.)	0

where
 D is the diameter of the cylinder;
 d_{sc} is the distance from the source to the centre C of the cylinder;
 ϕ is the supplement of the angle between lines SC and CR.

*) This expression applies only if the distance d_{sc} from the source S to cylinder C is much smaller than the distance d_{cr} from the cylinder to receiver; see figure 9.

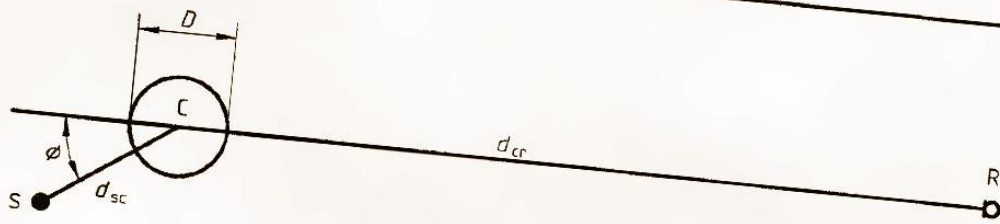


Figure 9 — Estimation of sound reflection coefficient for a cylinder

8 Meteorological correction (C_{met})

Use of equation (3) leads directly to an equivalent continuous A-weighted sound pressure level

$$C_{met} = C_0 [1 - 10(h_s + h_r)/d]$$

6.4.1 L_{eq} measurement

Measurements shall consist of the pass-by noise from five or more of each type of aircraft contributing significantly to the sound pressure level to be determined. Ensure that traffic pattern (runway use, take-off and landing procedures, airfleet mix, time-of-day distribution of the traffic) is relevant for the issue under consideration.

6.4.2 L_{max} measurement

If the purpose is to measure the maximum sound pressure level from air traffic in a specific residential area, ensure that the measurement period contains the aircraft types with the highest noise emission using the flight tracks of nearest proximity. Maximum sound pressure levels shall be determined from at least five and preferably 20 or more occurrences of the most noisy relevant aircraft operation. To estimate percentiles of the distribution of maximum sound pressure levels, record at least 20 relevant events. If it is not possible to obtain this many recordings, it shall be stated in the report how many aircraft pass-bys are analysed and the influence on the uncertainty shall be assessed.

NOTE Pass-by noise can be caused by aircraft in flight or on the ground, e.g. taxiing.

6.5 Industrial plants

6.5.1 L_{eq} measurement

The source operating conditions shall be divided into classes. For each class, the time variation of the sound emission from the plant shall be reasonably stationary in a stochastic sense. The variation shall be less than the variation in transmission-path attenuation due to varying weather conditions (see Clause 7). The time variation of the sound emission from the plant shall be determined from 5 min to 10 min L_{eq} values measured at a distance long enough to include noise contributions from all major sources and short enough to minimize meteorological effects (see Clause 7) during a certain operating condition. If the source is cyclic, the measurement time shall encompass a whole number of cycles. A new categorization of the operating conditions shall be made if the criterion is exceeded. If the criterion is met, measure L_{eq} during each class of operating condition and calculate the resulting L_{eq} , taking into account the frequency and duration of each class of operating condition.

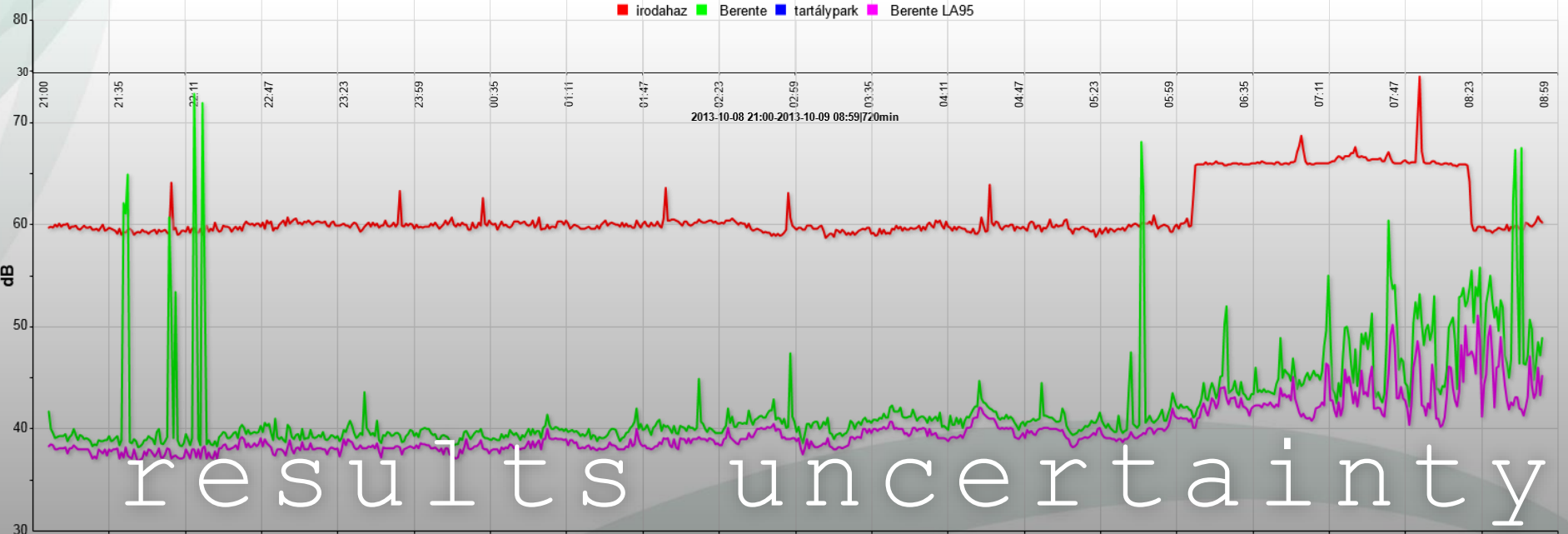
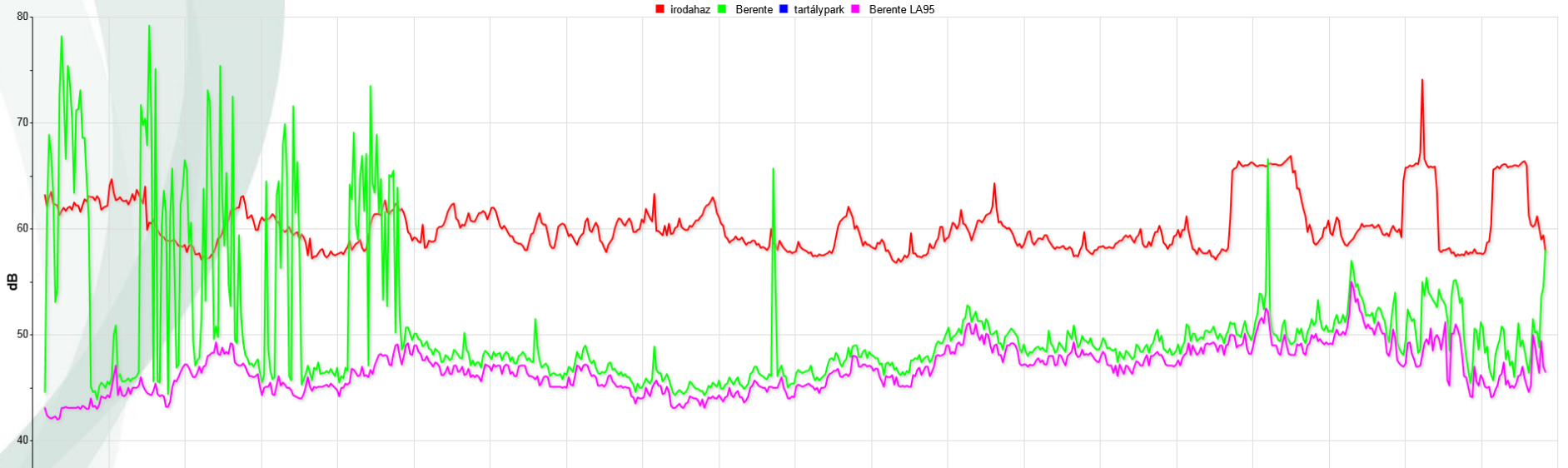
6.5.2 L_{max} measurement

If the purpose is to measure the maximum sound pressure level of noise from industrial plants, ensure that the measurement period contains the plant operating condition with the highest noise emission occurring nearest proximity to the receiver location. Maximum sound pressure levels shall be determined from at least five events of the most noisy relevant operating conditions.



NOISE CONTROL ACTION PLAN IMPLEMENTATION AT BORSODCHEM

INTER-NOISE 2016 HAMBURG



results uncertainty



The secret
funeral service
made by the sect
of noise experts





noise monitoring



DEPTH
GAUGE
90ft

different interests

in terms of investment

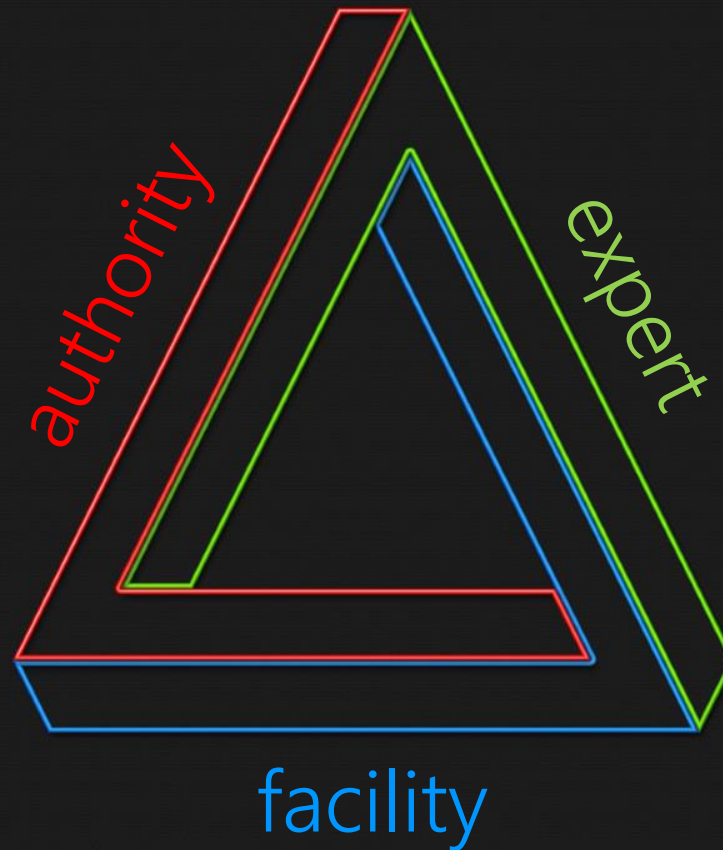


the total cost of the noise reduction exceeds

6 million €



communication difficulties



Authority and flexibility

the duration for the implementation is **10** years

we plan to carry out

34 noise reduction tasks

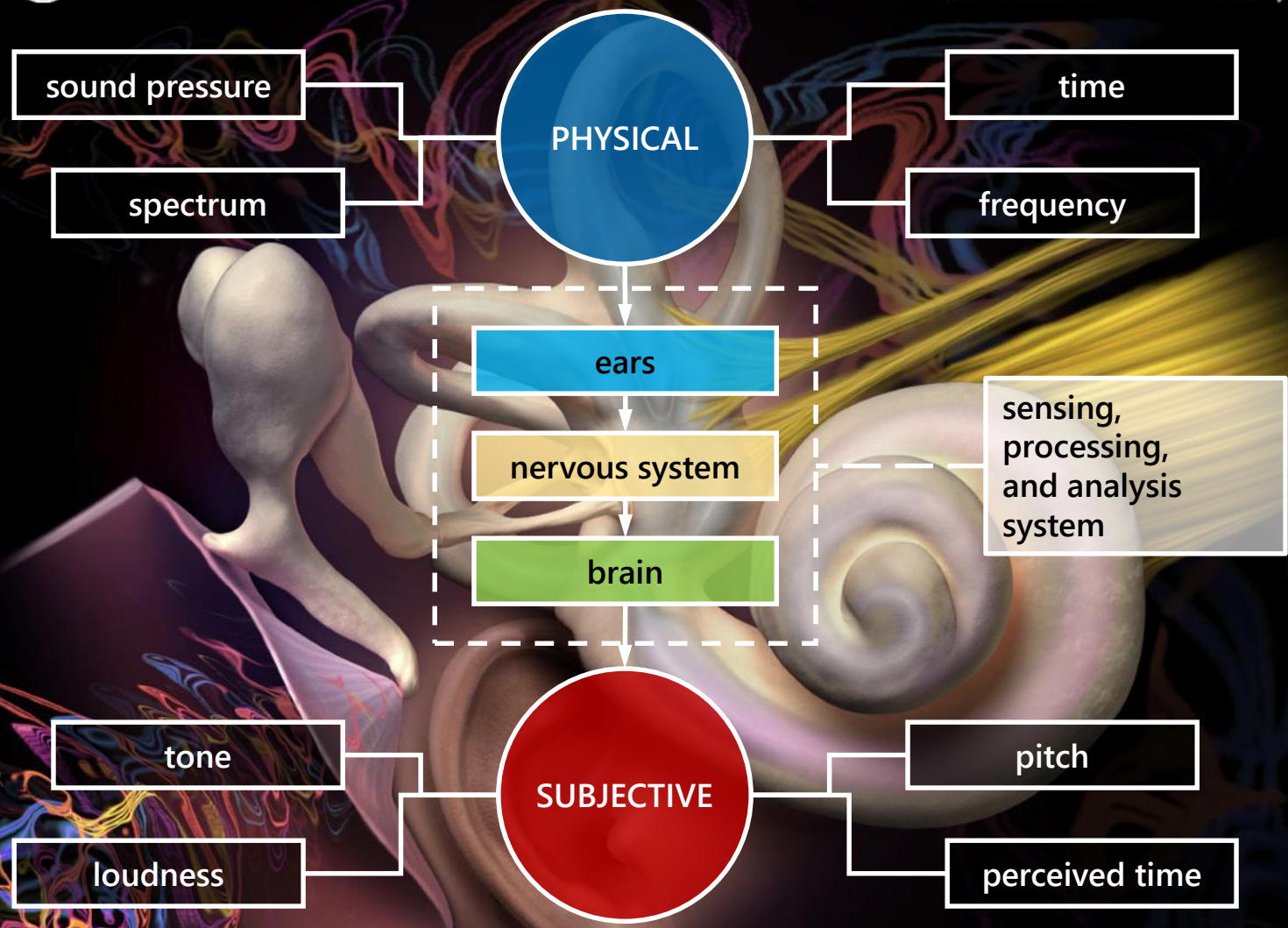
in **3** phases





chapter 5

THE SOLUTIONS



The development of sound sense

by Tamás Tarnóczy



*the trained hearing helps the expert
to identify the sound source*



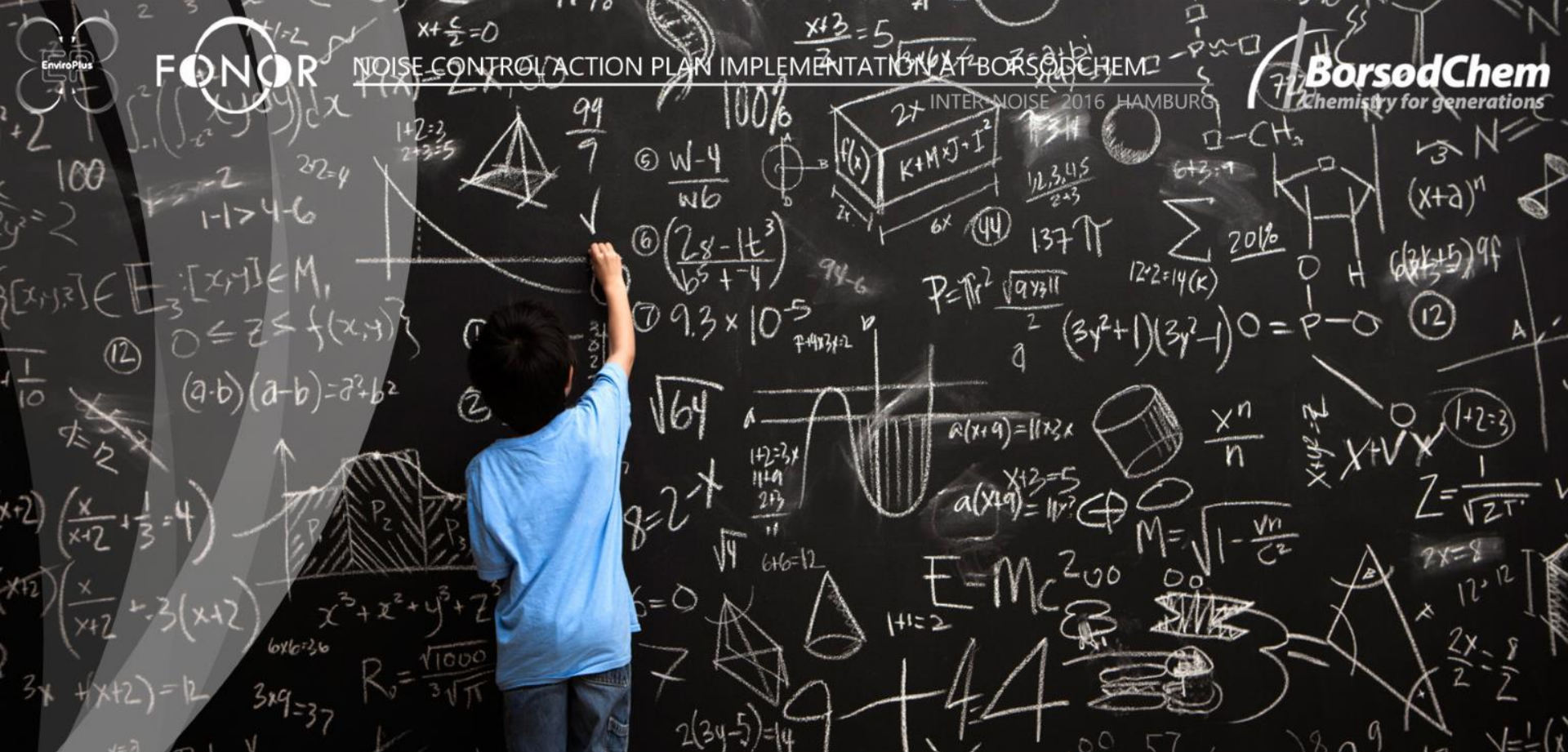


teaching the customer

WE SPEAK THE SAME LANGUAGE

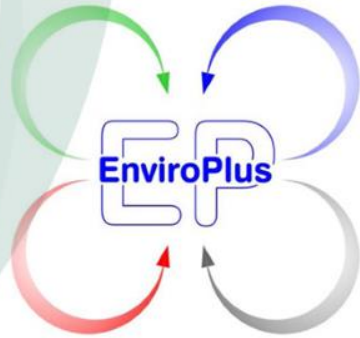
The preparation of the action plan is based on

- **instrumental analyses** near the noise sources
determine the source data of the noise sources
- **measurements** on the perception points and reference points
determine the propagation characteristics of the sound
- analysis of the **frequency** spectrum
identify sources with typical spectral characteristics
- noise **monitoring** system
determine the effects of the weather
- noise **modelling** / standard calculation methods
helps the identification of the dominant noise sources



the various methods have to form the overall image together

COMPLEX APPLICATION OF METHODS



PREVENCIÓ KFT.



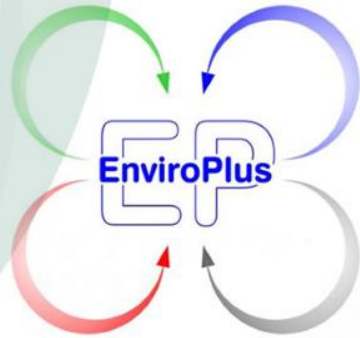


FONOR

NOISE CONTROL ACTION PLAN IMPLEMENTATION AT BORSODCHEM

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BorsodChem
Chemistry for generations

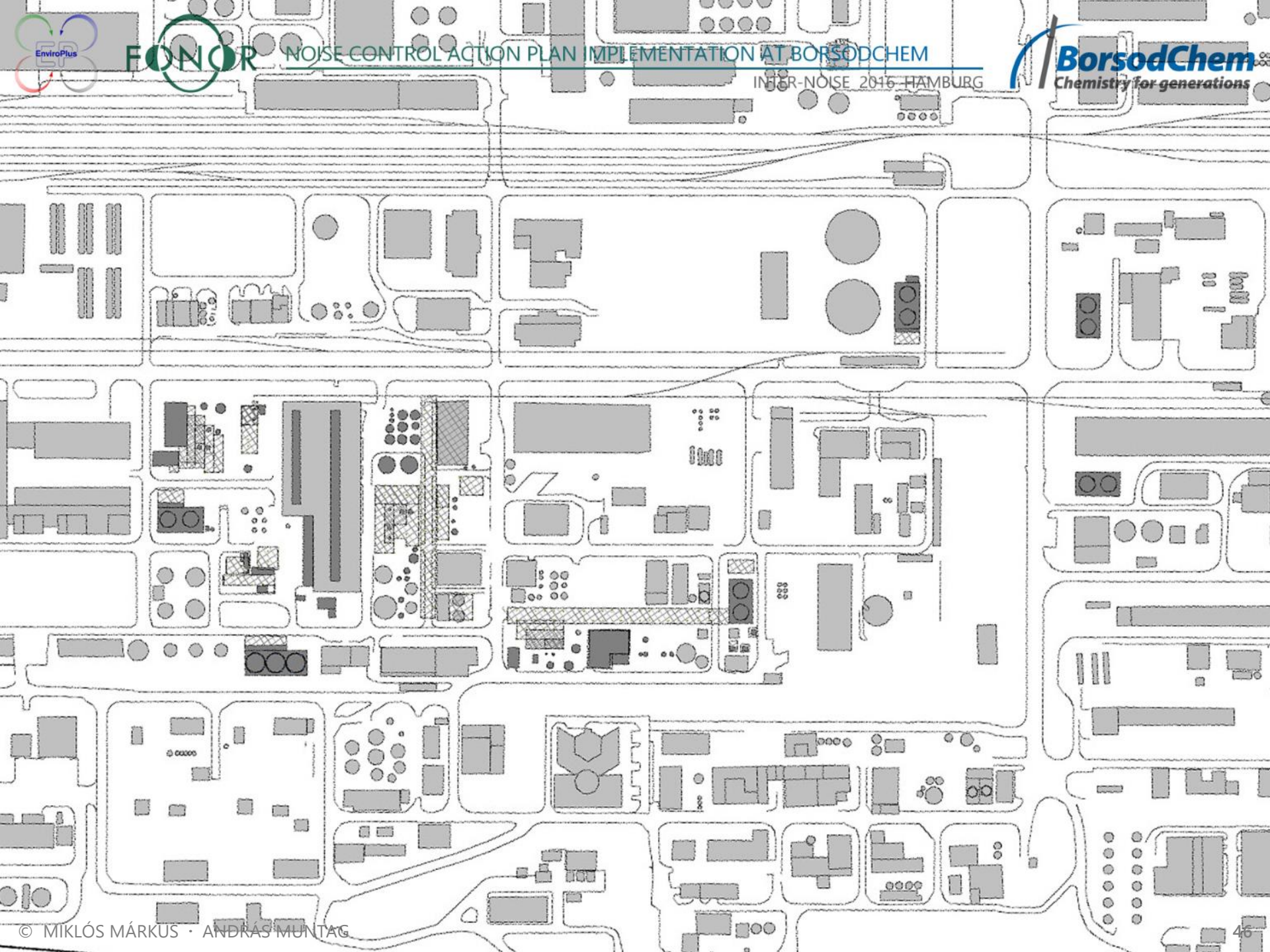
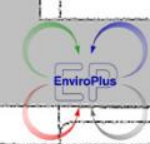


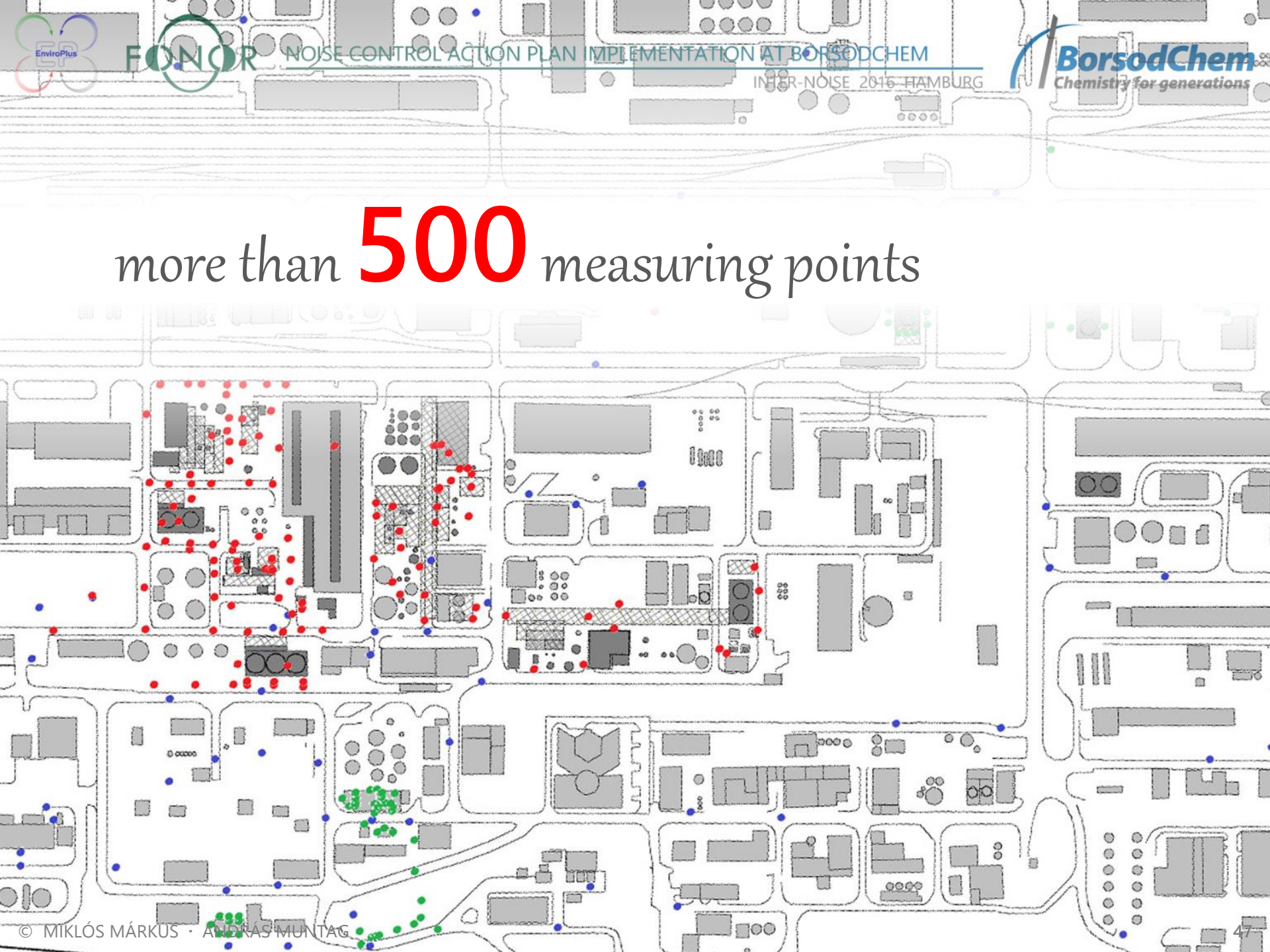
FONOR



PREVENCIÓ KFT.







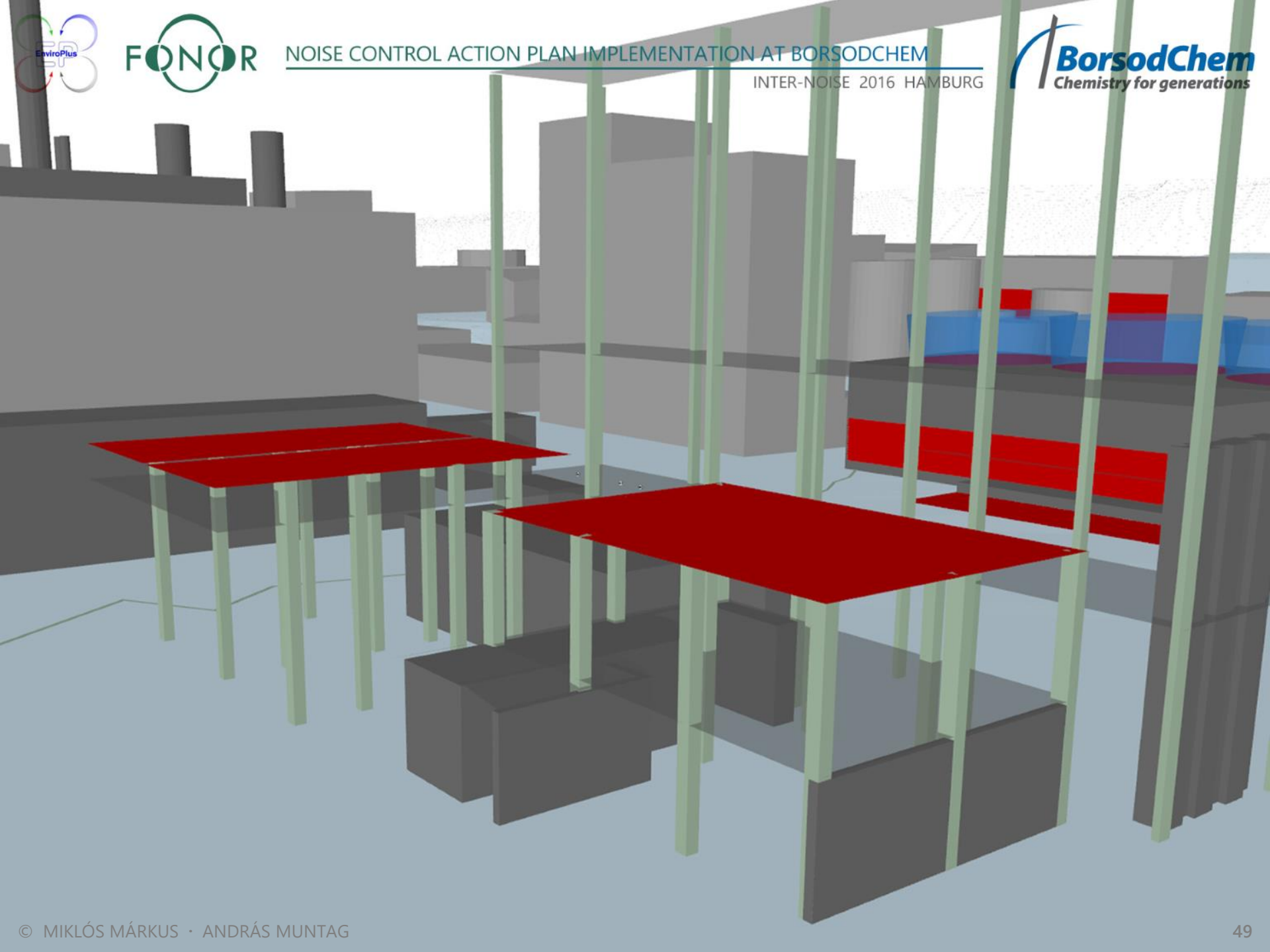
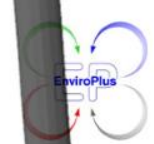
more than **500** measuring points

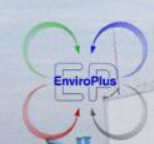


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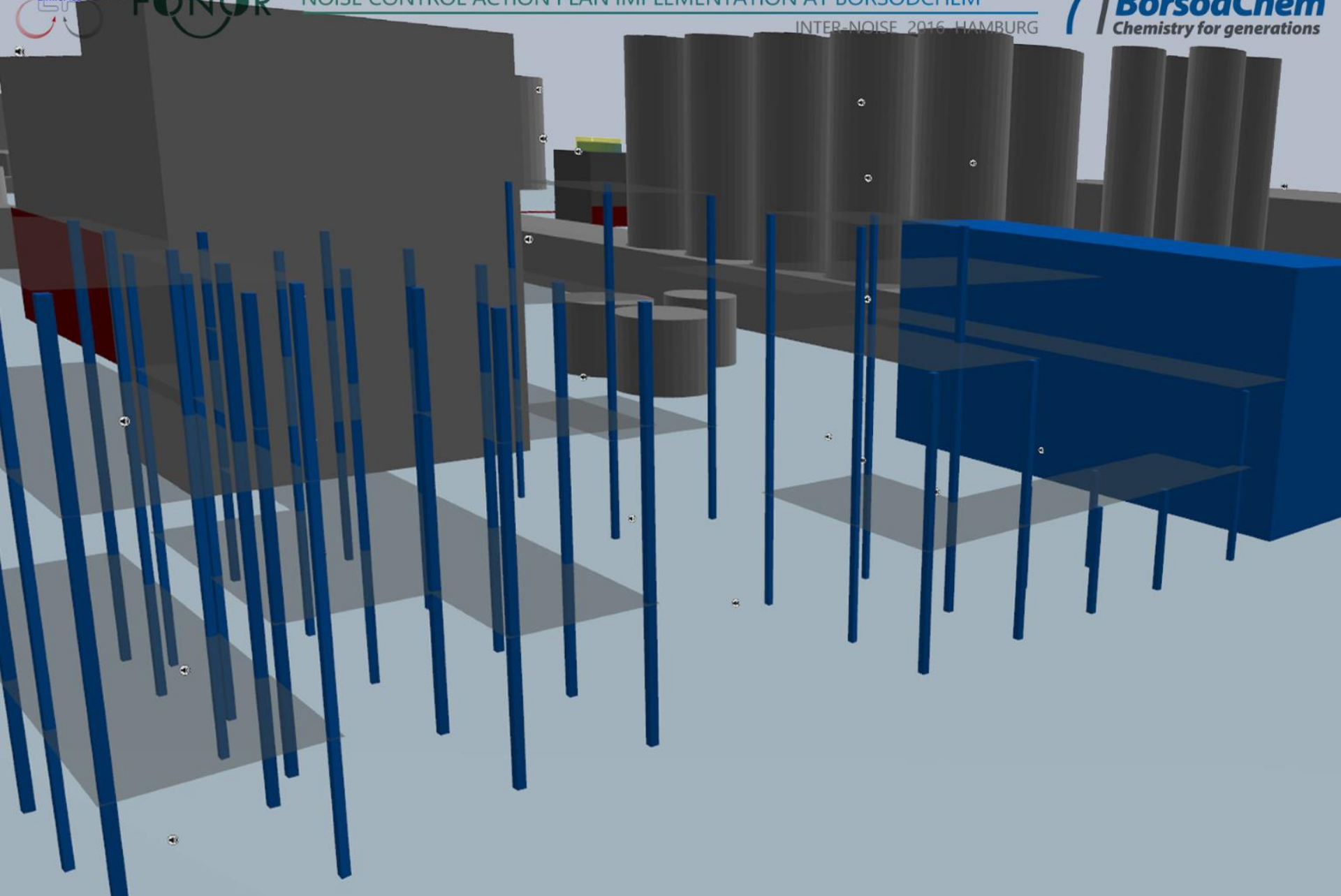




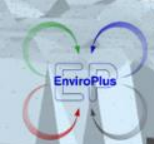
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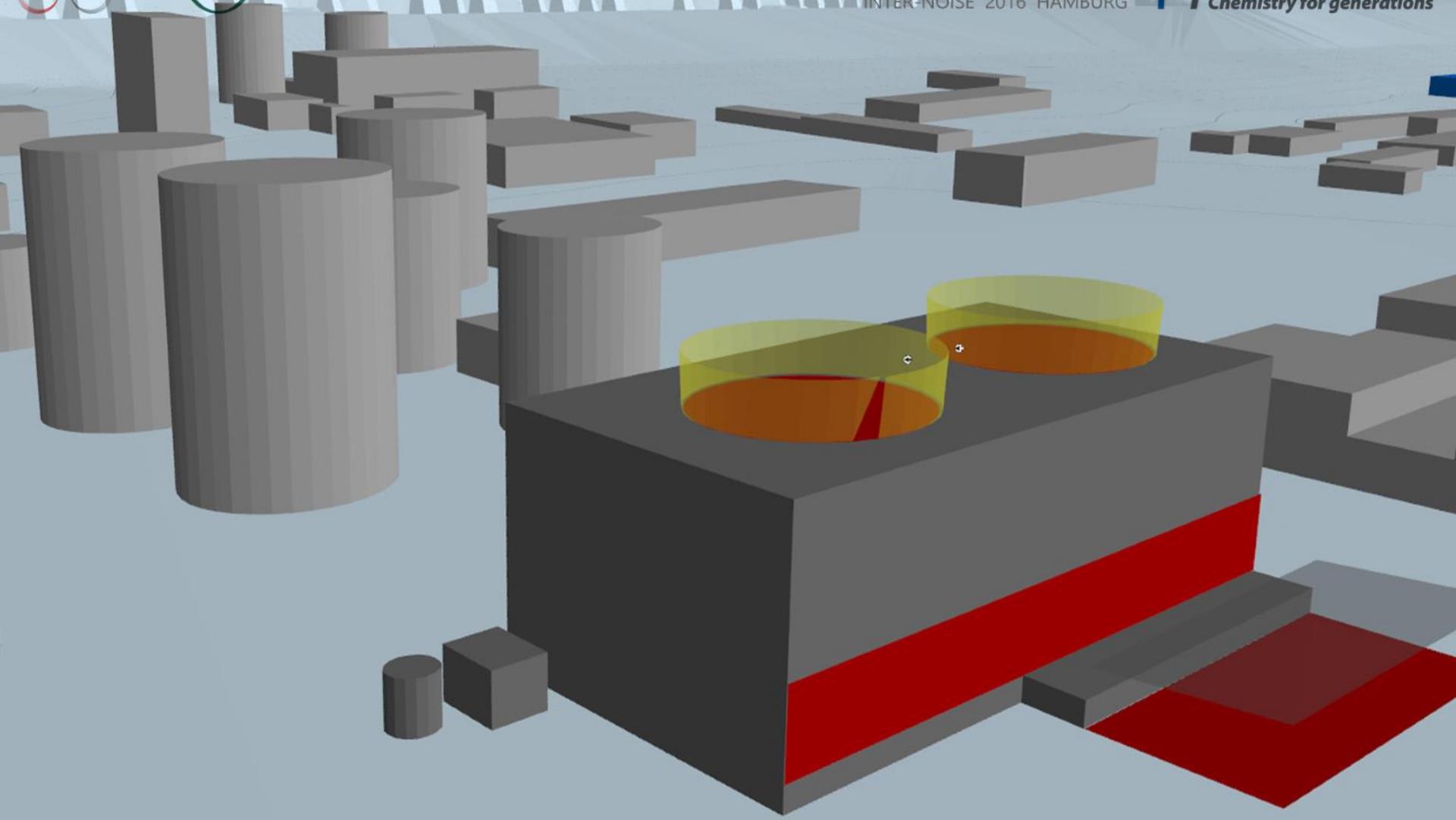






NOISE CONTROL ACTION PLAN IMPLEMENTATION AT BORSODCHEM

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„maxing out”
the measurement height





NOISE CONTROL ACTION PLAN IMPLEMENTATION AT BORSODCHEM

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Thank you for your attention

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