



**vito**

vision on technology

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## **ETV: lessons learned from practice**

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# Outline

- » Test cases within AIRTV
- » Technology validation at VITO
- » Comparison experiences AIRTV - VITO
- » Conclusions

# Test cases within AIRTV

- » Goal of AIRTV:  
Set-up of an international verification system for air abatement technologies
- » Reason of performing verifications within the project:  
Verification procedure has to be more than a nice theory  
→ test cases to identify and solve hurdles and problems

# Technology validation at VITO

- » VITO: Flemish Institute for Technological Research
  - » Technology development
  - » Support industry, SME's
  - » Support government
  
- » Technology validation at VITO:
  - » Water treatment
  - » Soil treatment
  - » Air treatment
  - » Waste treatment

# Comparison experiences AIRTV - VITO

- 1 Introduction.....
  - 1.1 ETV and its purpose.....
  - 1.2 Purpose of this verification.....
  - 1.3 Reference to similar protocols.....
- 2 General description of product/technology.....
  - 2.1 Description of the technology.....
  - 2.2 Benefits of the technology.....
  - 2.3 Reference to BAT reference documents.....
  - 2.4 Expected environmental impact.....
  - 2.5 Field of application.....
  - 2.6 Requirements related to the user manual.....
  - 2.7 Overview on existing data.....
  - 2.8 History of the product.....
- 3 Detailed description of the parameters to be verified.....
  - 3.1 Parameters that verify the achievement of the stated benefit.....
  - 3.2 Additional parameters to verify the technology.....
  - 3.3 Summary of the parameters.....
- 4 Test related issues.....
  - 4.1 Requirements on test location.....
  - 4.2 Description of the test procedures and test methods.....
  - 4.3 Requirements on Test Plans.....
  - 4.4 Use of existing results.....
  - 4.5 Specific requirements on the Test Report or the test laboratory.....
  - 4.6 Summary of parameters to be tested.....
- 5 References.....
- 6 Appendices.....
  - 6.1 Definitions, abbreviations and symbols.....
  - 6.2 Authors of protocol and involved organisations.....
  - 6.3 Liability exclusion.....

CLAIM?

USE: YES OR NO?

TEST PLAN?  
LOCATION?

INTERPRETATION?

PUBLICATION?

# Problem 1: How to write the perfect claim?

From vendor benefits to workable claim: (Genano Technology)

## » *Benefits as indicated by technology owner*

- » Removal of particles down to **3 nm** with an efficiency **up to** 99,5 %;
- » Self-cleaning and no waste to dispose;
- » Low maintenance;
- » Long life span;
- » Low energy consumption (constant pressure drop);
- » Simultaneous removal of viruses, bacteria, soot particles from traffic... ?

Suppliers  
info

## » *The final claim*

- » The Genano technology claims to remove all particles with a diameter **between 20 nm and 10 µm** with a filter efficiency **of at least 80 %**. Hereby, filter efficiency is defined as the ratio of particles trapped by a filter over the total number of particles found in the air upstream of the filter.
- » When the purifier is operating, **ozone** is generated. Genano claims that the produced ozone concentration will not exceed 0,05 ppm.

# Problem 1: How to write the perfect claim?

- » Experiences VITO:
  - » Vendor has a commercial claim
    - » Broad working range: ie al types of high caloric waste
    - » Highlighting highest efficiëncy: up to X %
    - » Verify all possibilities
  - » Challenge:
    - » Define largest uniform applications
    - » Make sure claim is verifiable
  
- » Driving force: cost reduction

# Problem 2: Source oriented measures?

- » AIRTV:
  - » essential to system
  - » Difficult to verify (case: high velocity burners)
  - » Consensus:
    - » Absolute values
    - » Comparison to reference values (BREF)
    - » Comparison to older technology on same site

# Problem 2: Source oriented measures?

- » Measures at VITO:
  - » Most efficient way towards sustainable production
  - » Comparison to reference values
  - » Back to back testing:
    - » same installation
    - » same production
  - » Parallel testing



# Problem 3: Use of existing data

- » Goal of using existing data: decrease verification costs  
But: cost-saving or time consuming?
- » Experience within AIRTV very broad:
  - » Combi-scrubber (time-consuming, additional measurements needed)
  - » Turbosorp technology (positive experiences)
  - » Elosorb technology (not all relevant parameters covered)

# Problem 3: Use of existing data

## » Advantages:

- » Data from longer period of operation
- » Cost and time saving
- » Better planning of extra measurements

## » Disadvantages:

- » Methods not mentioned in detail
- » Measurements not according international standards
- » Test conditions not fulfilled
- » Only data for few parameters reported
- » No errors on measurement
- » Only most positive data provided? independant test lab?

# Problem 3: Use of existing data

- » Experiences VITO:
  - » Always with new measurements
  - » Use existing data to set up experiments:
    - » Validation reports
    - » Indicative measurements
    - » Lab measurements
  
- » Time consuming?
- » Cost saving



# Problem 4: Test plan and test location

- » Writing the testplan: who?  
→ Task of a measurement expert, technology expert, VM?
- » Who decides on a suitable test location?  
→ Vendor, VM, expert(s)?
- » Measurement methods: what if no international standard is available (innovative technologies!)?
- » Communication problems: define clearly what you need and when!
- » Who decides which test lab?
- » Who can be expert? Payment of experts?

# Problem 4: Test plan and test location

- » Situation at VITO:
  - » Writing of basic test plan with different departments (all with their own expertise)
  - » Selection of test location in early stage - Decision made by VITO and Vendor
  - » Adaptation of test plan to specific conditions
  - » Communication always crucial!



# Problem 5: Interpretation of results

- » What with uncertainties on measurements?  
When is a claim successfully verified?  
(cfr. Combi-scrubber)

Parameter	Claim	Measured value
Ammonia reduction efficiency	> 80 %	82 ± 3 %
(Total) dust reduction efficiency	> 90 %	95 ± 6 %
PM <sub>10</sub> reduction efficiency	> 80 %	83 ± 5 %
Odor reduction		
- odor reduction efficiency (OR)	> 80 %	Not applicable
- outlet concentration	< 300 ou <sub>E</sub>	110 ± 50 ou <sub>E</sub>

- » Transferability of results? (cfr. APP Odor Abatement System)  
*“APP Odor Abatement System claims an odor reduction of 85 % for a dry pet food production”*

Also for other food production facilities??

# Problem 5: Interpretation of results

- » Experience VITO:
  - » No problems when the result of the validation is positive for the vendor
  - » If results are negative or dubious: arguments from vendor about:
    - » Test setup (wrong, not representative,...)
    - » Measurements (bad executed,...)
    - » Calamities at production site
    - » ...
  - » Very important:
    - » Get approval of test plan from vendor before testing
    - » Follow up protocol correctly
    - » No transferability of results

# Problem 6: Publication?

- » Limit amount of documents
- » Documents needed:
  - » Full report
  - » Summary
  - » Censored report

# Problem 6: Publication?

- » VITO experience:
  - » Validation report + executive summary
  - » Commercial use OK for:
    - » Full report
    - » Executive summary
  - » Commercial folders: always approval needed

“Technology tested by VITO”

# Problem 7: What with negative results?

- » Important to start with realistic claim
- » One negative result = unsuccessful verification?
- » Improvement of technology necessary before new measurements are possible?
- » Publication of negative verification results?
  - » Hurdle for ETV system
  - » Interesting for users

# Problem 7: What with negative results?

- » VITO experience:
  - » Claim setup, selection of test setup/location very important
  - » Publication of negative results problematic for vendor
  - » In practice no publication of negative results



# Final conclusions

AIRTV versus regular technology validation at VITO:

- » SAME ISSUES AND PROBLEMS, but:
    - » Communication more important in AIRTV
    - » Broader acceptance of results if they are performed in a European verification system
  
  - » Costs stay approximately the same for an ETV with measurements and a complete validation test
- Practical setup of ETV system and European recognition of the system are crucial to success



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