



## Testing network for verification of air emissions abatement technologies

A SPECIFIC TARGETED RESEARCH PROJECT FUNDED BY THE 6TH FRAMEWORK PROGRAMME OF THE EUROPEAN UNION



### BRIEF FACTS ABOUT AIRTV

#### Objectives:

The strategic objective of AIRTV is to reduce the period of time between the initiation and development of Environmental sound Technologies (EsT) in the field of air emissions abatement technologies in Europe and their introduction in the market. Special emphasis is taken on helping enterprises about new and innovative technologies by faster entry and full access to the European market and beyond.

#### Approach:

To achieve these objectives AIRTV is developing pre-normative protocols for credible environmental technology verification (ETV). AIRTV will also develop a common understanding on ETV resulting in a "CEN workshop agreement" (CEN – European Committee for Standardization).

#### Time frame:

11/2006 to 11/2009

#### Finances:

Total project volume 2.16 million Euros; ~64% EU funding

#### Organisations:

CEN – European Committee for Standardization (Belgium)

DECHEMA e.V. – Society for Chemical Engineering and Biotechnology (Germany)

EUCETSA – European Committee of Environmental Technology Suppliers Associations (Belgium)

Fundación LEIA (Spain)

IFARE – French-German Institute for Environmental Research (Germany)

INIG – Oil and Gas Institute (Poland)

IVL – Swedish Environmental Research Institute (Sweden)

JRC-IPTS – Institute for Prospective Technological Studies (Spain)

TNO – The Netherlands Organisation for Applied Scientific Research (The Netherlands)

UBA-A – Federal Environment Agency (Austria)

VITO – Flemish Institute for Technological Research (Belgium)

### EDITORIAL

## European Environmental Technology Verification on the move: From research to practice

A European goal is to protect and to improve the environment because its intactness is essential for keeping up the wealth in Europe and beyond in a long-term point of view. Supporting the establishment of innovative Environmental sound Technologies (EsT's) on the market is one way to reach the target. An independent proof of the performance of the product assures its reliability and can raise confidence of decision-makers since vendors of innovative EsT's face difficulties in guaranteeing by their own that their products work well.



While the U.S. Americans, Canadians, Japanese, and other countries have a so-called "Environmental Technology Verification (ETV)" system established that helps giving an independent proof of technology performance, the EC plans to develop a corresponding European ETV system in

order to give vendors more reliability and costumers more confidence. ETV is procedure for determining performance of environmental technologies with a high level of reliability. Hence, the EC has funded several projects that aim to support the development of a EU ETV system for EsT's. Each project is scoped to a specific environmental technology application range. AIRTV is the launched project that shall sustain the development of a EU ETV scheme for air emission abatement technologies. The project is running since 2006 and is participated by 11 experts from 7 countries within the EU.

The preliminary developed EU ETV scheme for air emission abatement technologies is currently under test; nine air emission abatement technologies were chosen for pilot verifications.

Outcomes of the test shall help to move from a nice theory towards a workable ETV system by straighten occurred hurdles and make it ready for its implementation in Europe.

The next important project activity will be the conference "Accelerating Eco-innovation through Environmental Technology Verification" which will be held at the representative of Baden-Württemberg to the European Union in Brussels on 12<sup>th</sup>-13<sup>th</sup> October 2009. During this meeting different kinds of international and global ETV activities will be introduced and results of previous projects will be presented.

Please visit the AIRTV homepage [www.airtv.eu](http://www.airtv.eu) in order to find out more about the project.

Dennis Krämer,  
DECHEMA e.V.



## Test cases within AIRTV: What have we learned in practice?

As mentioned in the previous newsletters the last year was dedicated to performing tests to make sure that the developed procedure for the verification of air treatment technologies ensures good results and is applicable and practical. These tests were performed for very different pollutants ranging from dust, VOC, ammonia to odour. All these pollutants have their specific points of attention. Now the results are in and we have made an evaluation.

All of the nine test cases had their specific hurdles to overcome and in the end almost all test cases were successfully verified with existing data and/or newly measured data. For the other test cases, solutions are worked out at the moment. An important finding was that most hurdles came back in more than one test case. In the following paragraphs we will go deeper into the most important hurdles, which we have clustered to give a better overview.

### The vendor claim:

A crucial step in the verification process is the vendor claim. During the first discussions with the vendor the claim is in most cases not properly formulated by the vendor and/or not all necessary parameters to evaluate environmental benefits and

cross media effects of the technology appear in the claim. This is not on purpose but because of lack of specific knowledge on environment vulnerability and threats. In order to avoid negative or incomplete results, a realistic and complete performance claim has to be determined for the technology in the first step. The claim has to be both verifiable in an application as representative as possible for the whole performance spectrum and without omitting relevant parameters. This should be achievable by intensive discussion and checking together with the technology supplier already in the application phase. For finding a suited verification site and strategy, adapting the verification set-up of one or few existing installations with their own characteristics to a sometimes wide application range of a technology remains challenging, however is essential for a meaningful verification result.

### Use of existing data:

The goal of using existing data was decreasing the costs of verification. In many cases, using existing data can be an efficient solution, especially when data from a full-scale operation are available with sufficient data quality. By using this type of data, the performance of a technology is

checked over a longer period and uncertainties are reduced.

On the other hand the use of existing data has some drawbacks because checking (the usefulness of) existing data is a really time-consuming job and the test verifications showed that most existing data does not fulfil the requirements to make them fit for verification.

Even if all parameters defined in the verification protocol were included and independent experts performed measurements, it is still uncertain, if the results are typical for the installation or a lucky exception. Here too, expert judgments and clear procedures can help. A verification only based on existing data was found to be challenging, but this can be improved when the ETV system is installed and the vendors' measurements are adapted to the needs of a later ETV verification. These findings raise the question if using such data is really cost saving.

### Interpretation of results

The interpretation of results seemed very difficult due to measurement uncertainties. For example claimed removal efficiency of at least 80 % was given, but the measured

## 6<sup>th</sup> ETAP Forum in Berlin, Germany, on 2<sup>nd</sup> – 3<sup>rd</sup> April 2009

During the 6<sup>th</sup> ETAP (Environmental Technologies Action Plan) forum 'Technology Transfer: Creating partnerships for stimulating economic renewal' held in Berlin, Germany, the potentially existing advantages by eco-innovation and innovative environmental technologies in weaken the challenges of climate change and financial crises were reviewed. So, the Forum addressed the relevant issue of how to cross the financial crisis without damage or even how to straighten up the environmental industry in these difficult times. The discussion had the goal to find more efficient ways to encourage technology transfer in Europe and beyond. Particular, the target was to support small and medium-sized enterprises (SME's) and co-operation with developing countries.

The following text is an abridgement of the speech by Karl Falkenberg, Director-General of the European Commission Environment DG, held during the ETAP forum: "The global economy has stalled after a long period of rapid growth and we are now facing a severe global recession. The current crisis spread rapidly from financial institutions to industry and services, leading economists repeatedly to revise

down growth estimates. Public policies and budgets have been heavily solicited to save financial services, then to support economic sectors in difficulty, and now to face the social consequences.

Recovery plans have been drawn up and implemented rapidly. These often include plans for green investments – involving more than € 300 billion globally according to the world's largest banking group HSBC – seeing it as an opportunity to create new and competitive industries while addressing the pressing environmental challenges. A key element in the recovery will thus be green technology transfer to help countries cope with the impacts of climate change and to have them participating progressively but actively in the reduction of greenhouse gas emissions. Particularly in the case of developing countries, this will allow them to contribute to the global fight against climate change.

To achieve such technology transfer successfully, we must analyse and overcome the obstacles – be it intellectual property rights, trade tariffs and barriers, lack of access to capital, unstable regulatory regimes or harmful public subsidies.

The EU is already taking steps in this direction. The competitiveness and innovation programme (CIP) is helping EU SME's through investments in venture capital funds with a strong focus on eco-innovation and through pilot and market-replication projects in areas such as recycling and green businesses. The EU and member states are promoting green public procurements actively to help boost markets for environmental technologies. And the Global Energy Efficiency and Renewable Energy Fund is mobilising private investment up to € 1 billion for projects that will accelerate the transfer of greener energy technologies to developing countries and economies in transition.

ETAP offers a combination of commission actions such as regulations and programmes cooperation of member states and mobilisation of stakeholders. But it is only through the active involvement of all actors – the authorities, the entrepreneurs and the general public – that we can achieve successful transfer of green technologies."

removal efficiency was  $79 \pm 8 \%$  – shall be the claim verified or not? Furthermore transferability of results is a big issue as the claim is checked for a specific situation.

#### How to handle a failed verification?

Negative results will occur in the ETV system. Publication of negative verification results can be a very important hurdle to enter the verification system and slow down the technology development. Procedures for this situation have to be available in an operating EU system.

#### Role of expert

The role of expert is very important and very difficult, especially during the first verifications. Checking what is written down is not the difficulty, but checking if nothing is missing is complicated. Comparing verification reports to each other makes life

much easier. Therefore, extra guidelines or a checklist for experts seems to be necessary.

Also the choice of experts is very important. The “call for experts” procedure has to be completed and published and the choice of experts for particular verification processes should be agreed between the technology vendor and the verification team represented by a verification manager. In all tests at least an expert on measurements has to be included.

#### Verification of technologies that are source oriented

Source oriented approaches are sometimes very difficult to assess because the results are very specific to the process that they are applied in (for example a burner in different types of kilns). If a comparison to

a reference emission can be made this always has the preference. Sometimes only a comparison between a more conventional technology and the new technology can be made on that test location. In a lot of cases the former equipment/installation doesn't exist anymore. To make the verification possible, historical information provided by the user of the old technology has to be used, but judging the usefulness of historical data for verification is very difficult.

At the moment clear guidelines are set up to overcome most of these hurdles. For most hurdles consensus on the way of handling these problems is almost reached within the AIRT TV project. These solutions will be described in one of the next deliverables and will be incorporated into the verification procedure.

## Test cases within AIRT TV: Technology verification with existing data

The following test procedure has been developed within the AIRT TV project:

1. **Entry: Quick check (what is given (claimed), what not)**
2. **Definition of parameters to be tested: a protocol**
  - Involves: vendor, external experts, and stakeholders
  - Which values to be reached (European limits?)
3. **Testing**
4. **Check of results**
  - Results versus claims
  - Quality control (e.g. followed procedures determined in protocol)
5. **Verification report and logo**

To prove the workability of the system nine different test cases as mentioned before are analysed within AIRT TV. The first test case, Genano technology has been reported in the previous newsletter. Another test case is the Turbosorp® Technology by Austrian Energy & Environment.

This technology is a dry wastewater free flue gas cleaning process. It is suitable for treatment of flue gases from waste to energy plants, coal or oil fired power plants or industrial applications.

In the Turbosorp® system, the flue gas flows through the turbo absorber from the bottom to the top. Fly ash from incineration, serves as a bed. Fresh additives consisting of either  $\text{Ca}(\text{OH})_2$  or  $\text{CaO}$  and activated carbon are fed into the turbo-absorber.

Solid material, which has been thrown out of the absorber, is returned to the reactor as recirculate. Water is also fed in to lower the flue gas temperature and achieve higher separation performance. Apart from the evaporation and cooling phases, this results in an increase in relative humidity and

thus an activation of the additives. Solid, salt-like reaction products are formed during the reaction of the additive with the acid, and gases from incineration.

The activated carbon ensures good heavy metal and dioxin removal. The polluted

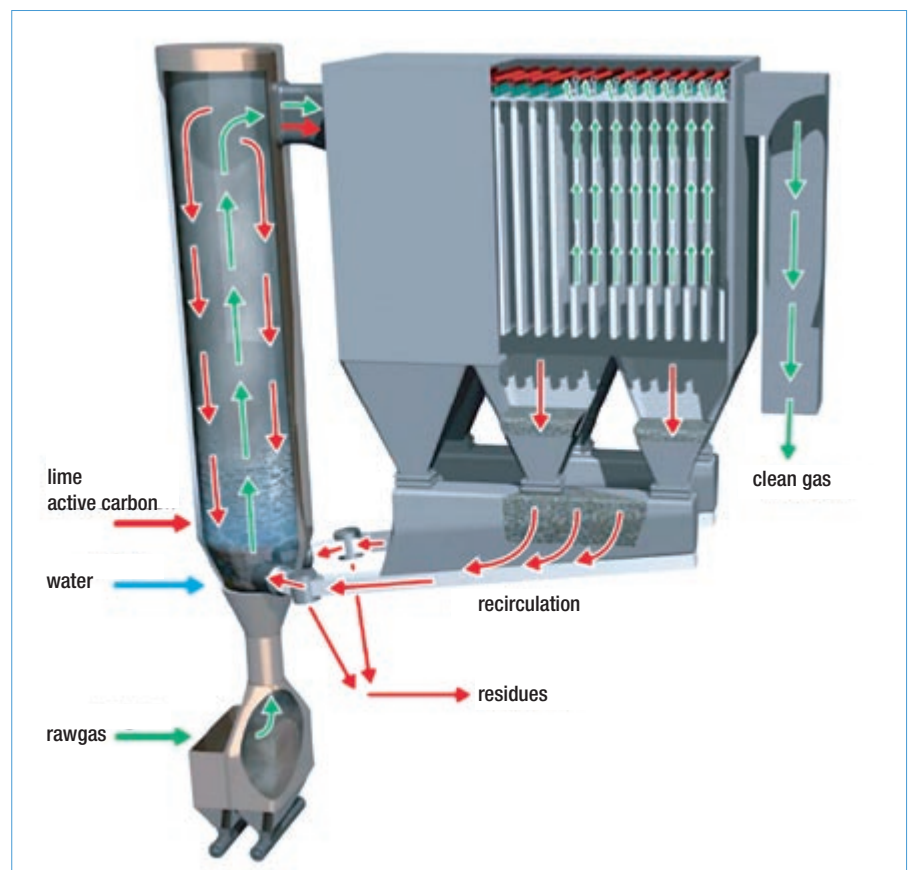


Figure 1: Picture of the absorber, the fabric filter and the recirculation of the gas stream in the Turbosorp® system.

gas is constantly subjected to a reaction agent surplus with the consequence that continuous pollutant removal is achieved. As a result of intelligent process management with regard to the operational temperature, solids recirculation and the dosed additives, material consumption, and the quantities of residues are kept to a minimum.

The Turbosorp® Technology is an end-of-pipe reduction technology that can be used to reduce emissions of acid gases (e.g. SO<sub>2</sub>, HCl, HF), particulate matter including heavy metals (e.g. Hg, Cd, Tl), dioxins and furans, and organic carbon. This multi-pollutant approach is ideal for installations with a limited amount of available space. Furthermore, the necessary investment for the erection of an abatement facility of this type is low in comparison with other technologies, albeit the sorbent costs are higher as compared to the wet process. Due to the simplicity of the design of the system components, very high levels of availability are guaranteed and the technology requires minimum maintenance expenditure.

A major advantage of the Turbosorp® technology is that it needs little or no water which makes it suitable for arid regions of the world. Furthermore no reheating of any kind is required. The resulting residues are composed of salt-like reaction products

and are suitable for landfilling. For the treated pollutants the emission limits according to the Waste Incineration Directive (2000/76/EC) can be easily fulfilled.

The Turbosorp® technology claims a reduction of the concentration of acid gases (HCl, HF, SO<sub>2</sub>), heavy metals (Hg, Cd, Tl) and PCDD/F by at least 90 %, dust by at least 99 %. The concentration of organic carbon in the clean gas is lower than 10 mg/Nm<sup>3</sup> (legal boundary limit in Austria).

In difference to other test cases the verification was able to rely on already existing data. The used tests were performed on-site at the thermal treatment plant in Arnoldstein (Kärntner Restmüllverwertung). The vendor (Austrian Energy & Environment) provided data from an independent testlab and additional data from the waste to energy plant.

It turned out that the Turbosorp® technology was successfully verified. The verification report included not only the verification of the claim, but also some additional parameters (use of power, water, lime and active carbon, man power and space needed, generated waste and an estimation of the lifetime of the technology). These parameters were not verified, but they were listed because it is important to know the side effects of the verified technology.

## Upcoming conference – Accelerating Eco-innovation through Environmental Technology Verification

The final conference for the project AIRTV will be held during the ETV conference “Accelerating Eco-innovation through Environmental Technology Verification” at the representative of Baden-Württemberg in Brussels, Belgium, on Oct 12<sup>th</sup>–13<sup>th</sup>, 2009. Environmental technology verification has the aim to support accelerating eco-innovation on the market. During this meeting different kinds of international and global ETV activities will be introduced, results of previous projects will be presented as well as European perspectives will be discussed.

The conference addresses technology providers, industry representatives and associations, politicians and regulators, with the aims to:

- Introduce ETV as a tool for technology promotion
- Show results of pilot verifications

- Open a gate for participants to present their views to the European Community and decision makers
- Actively discuss the pros and cons of EU ETV in a global market

Please find more information about the final conference of AIRTV and a registration form at the web page:

[www.eu-etv-strategy.eu](http://www.eu-etv-strategy.eu)

We would be very glad if the conference is of interest for you!

Please send in the filled out registration form to the attached address by 1<sup>st</sup> October 09 in the case you like to join the conference.

We are looking forward to seeing you in Brussels!

The AIRTV Team

## AdvanceETV

Innovative environmental technologies have the potential to decrease pollutant emission, improve the environment and, at the same time, increase the market position of companies. But many of those technologies do not find the way to gain acceptance in the market because the majority of buyers do not trust unproven technologies and therefore choose established products. In order to overcome this hurdle the European Commission is preparing an environmental technology verification (ETV) system. The purpose of ETV is to prove technology performance data by an authorized 3<sup>rd</sup> party using pre-defined protocols and procedures in order to provide purchasers with information about performance. So, a successful verification should deliver an independent proof that technology performance claims of technology providers is correct and results ease the diffusion of new Environmental sound Technologies (EsT) into the market.

Countries like USA, Canada, South Korea, Japan, and the Philippines have already established ETV systems while Europe is still in the process of development. Since global change becomes more and more important for vendors and purchaser mutual recognition and international harmonization would bring huge advantages for all sides.

The European Commission is funding the project AdvanceETV to increase the acceptance between the systems and create mutual recognition within and beyond Europe. Parties as of experienced institutions in the field of ETV from USA, Canada, and all over Europe belong to the AdvanceETV consortium and work strongly together to reach the goals of AdvanceETV. The coordination action is running since January 15<sup>th</sup>, 2009.

Please find more information about AdvanceETV on the web page [www.eu-etv-strategy.eu](http://www.eu-etv-strategy.eu).

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