Contract No: 518074

PROMOTE

Efficiency control and performance verification
of improved approaches for soil-groundwater protection and rehabilitation

Specific Targeted Research Project
Thematic priority: Global Change and Ecosystems

Advise on stakeholders needs and amendments integration, as result of the stakeholders consultation

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Dissemination Level

PU	Public	**X**
PP	Restricted to other programme participants (incl. the Commission Services)	☐
RE	Restricted to a group specified by the consortium (incl. the Commission Services)	☐
CO	Confidential, only for members of the consortium (incl. the Commission Services)	☐

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Topic 1 Introduction

The initiative of developing an Environmental Technology Verification System (ETV) was first announced by the European Commission (EC)in the Environmental Technology action plan. Calls for developing ETV systems have been announced by DG Research and DG Environment. It is expected that DG Enterprise will take over responsibility and provide financial funds to further environmental technology verification in the future.

Technology verification can be defined along the following lines:

> Technology performance data are checked by an authorized 3rd party using pre-specified technology verification protocols. A successful verification should deliver an independent proof that the technology performance claim of the technology developer is correct.

From the Commission side there is, up to now, no decision, neither if there is a financial budget to fund any new entity like a verification organisation (see Figure 1) nor, if so, to what extent.

PROMOTE is focussing on the verification of site characterisation/ monitoring and remediation technologies for soil and groundwater.

Figure 1: Topical role of PROMOTE in the EC framework

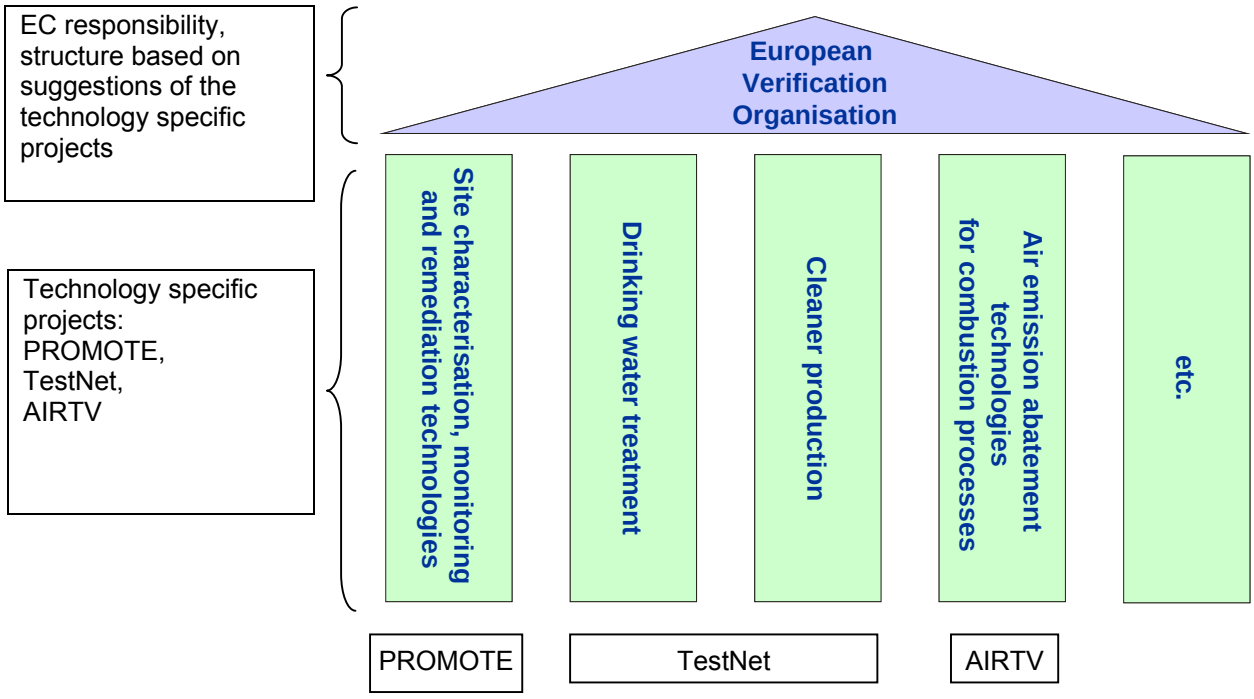
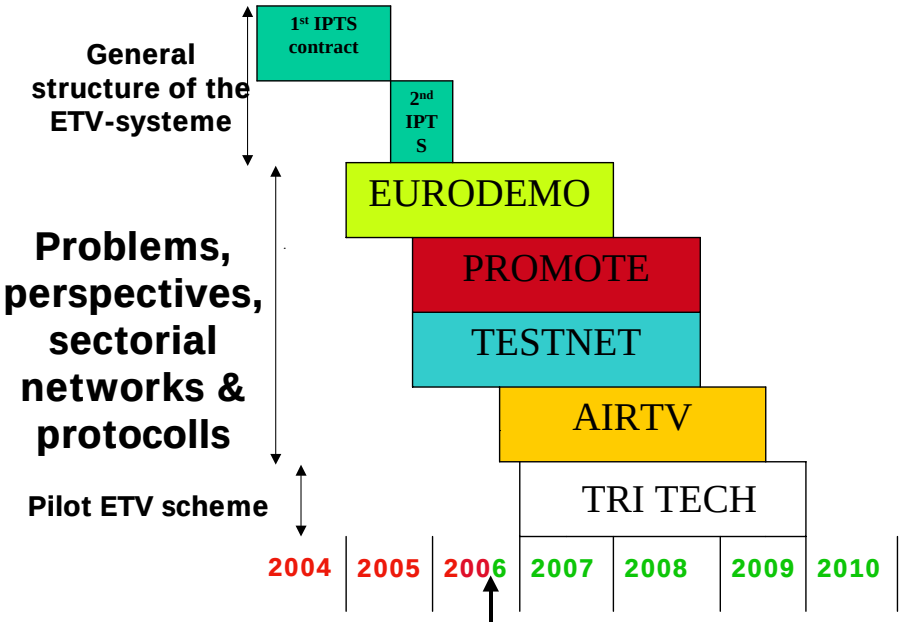


Figure 2: Schedule of ETV related studies, research and pilot projects



IPTS = Institute for Prospective Technological Studies, Joint Research Center of the European Commission; EURODEMO = Coordination action

In Comparison to established ETV systems as in the US and Canada, a European ETV system will supposedly help technologies getting acceptance within a bigger market, i.e. the EU-27 market.

Topic 2 Overall comments:

System acceptance:

- There are strong concerns especially from new member states with respect to introduction of more bureaucracy and costly burden.
- The implementation of ETV will be different for each member state, depending on existing, national structures.
- The reasons for a vendor to go for an ETV has two aspects credibility is one, access to a new market another.

Comparison to existing systems:

- For a generic ETV system one should carefully consider the strengths and weaknesses of existing certification and standardisation procedures.
- There has to be a clear distinction between the different systems, their approaches and goals.
- Besides well established procedures in normalisation, standardisation and materials testing there are several circles existing in other technological areas as e.g. EUMET, which

deal with introduction and broad use of innovative technologies. Support from CEN/STAR was offered and should be used to explore the ways of operation of these circles and their approaches to reach the goals.

- If the EC is willing to establish an ETV run at European level, i.e. establishing infrastructure and new entities the approach of PROMOTE seems to be provide a valid and efficient concept. In case the EC will support a more voluntary approach rather than a institutionalised one, another mode of operation should be considered. Here the definition of European procedures in accreditation and certification might be more appropriate. The chances and risks of both approaches were briefly assessed. Analysis of pros and cons by group:

ETV-system as discussed at the stakeholder workshop	**Accreditation & certification, ISO**
New system	Standard procedure, well established
Regulation needed	Self-organised
Centralised	De-central operation, national bodies
Selection of optimal expertise available possible	No influence on selection of experts to perform audits
Potential to support innovation at development stage	Starts later, for established / ready to market technology only.
Much stronger acceptance by regulators	

<u>To be considered for any technology verification system</u>

Intellectual property rights (IPR):

- How to safeguard IPR?
- What about IPR relevant knowledge gained during verification?[1]

General Barriers:

- Limitation in developing and adopting standard methods: high costs in relation to small market
- There is a lack of methodological harmonisation of hydro-geological characterisation of soil and subsoil in the EU
- There is a lack of recognition of best practise in site characterisation

Actual initiatives:

- SKB funded Dutch verification project
- Nordic ETV Center initiative, led by Christian Gron, DHI, DK
- Japan has started a ISO/TC190 request that could be considered

[1] By Heinrich Eisenmann

Scope of verification:

- Environmental soundness in terms of life cycle assessment and sustainability should not be considered for the project, since this would overburden the tasks of PROMOTE.
- If there are potential counter effects to a certain claim these, it should be referred to these in the claim section already.
- There should be a distinct criteria that clearly define if a technology is eligible for getting entry into a verification system.

Topic 3 Application Phase

Entry points:

- Besides the agreement, that the system should be a European system and basically centrally operated, national aspects in terms of acceptance have to be considered. Ways of national "entrance", "ambassadors" or national contact points could address the latter considerations. The issue appears to be crucial, in order to have a system that is accepted all-over Europe, i.e. with harmonised rules on the one hand side and easy entrance and support to SMEs on the other, which avoid, for example, language barriers.
- Potential entry points could be:
  - Innovation Relay Centres
  - Chambers of commerce
  - other national organisations for entry, if driven by larger markets
- Single vs. multiple entry points: Moving from English as the only ETV language to multiple languages could extent the recognition within a country. English only, on the other hand would guarantee a wider spreading of the results.

Eligibility to apply:

- Vendor and regulator should be able to initiate a verification procedure
- Verification procedures should allow testing of (A) one technology or (B) particular monitoring or remediation technologies following an ETV call.

- **Claim:**
- The claim definition should already be taken care of in the application phase.
- The definition of a claim may vary, dependent on the stakeholder perspective.
- The claim definition is crucial as it decides on cost, duration and the potential to come to a successful verification.
- Claim definition & specification is important and has to be done with great care!
- In case a vendor is driving an ETV for his technology: is the test design, claim, etc. the intellectual property of the vendor?

- In general, ETV results could be public as far as IPR is respected. Though it has to be considered that this will strongly depend on the ratio of public/private ETV funding.
- Environmental soundness should not be included in the claim, may be only in outstanding critical approaches, as this is to much to achieve for ETV at the moment.

Topic 4 Design Phase

Role and selection of a test lab:

- Test labs should be relevant and appropriate in terms of market and technology (vendor comment).
- Countries may request their own (different) set of data
  - ⇨ will depend on status (political strength) of EU ETV
  - ⇨ If this is the case a few labs may be enough, but the procedure must be consistent and reliable – this may vary between technologies.
- If test labs will be held responsible in terms of liability they have to be involved in the design phase!

Design phase aspects:

- The design is crucial since there has to be agreement between vendor, experts, the test lab and other stakeholder
- The design is strongly related to the claim
- Three levels of design:
  1. general requirements, like quality assurance of the used chemicals, characterisation of the test site…
  2. generic protocol for a cluster of technologies
  3. test plan for individual technologies
- Potential national requirements on the design of the tests have to be considered.
- The biggest challenge for verification lies with complex technologies[2]

Who should be involved in the design phase:

- The verification board should re-iterate the suggested design with vendor, experts, other stakeholder
  - ⇨ If all the work should be done within the verification board, this would contradict the need of being lea and cost efficient.[3]
- Stakeholders involved in the design phase should be ideally the ones, which form the major European market and represent different member states[4]

Claim review in the design phase:

[2] by John Hennstock CL:AIRE
[3] by Divyesh Trivedi, NICOLE

- Claim definition has to tackle geological boundary conditions[5]
- Claim definition has to be reasonable in terms of an existing or suggested reference method
- Question: Thinking of a group of technologies, are there standardised parameter sets (or claim envelops) that can be defined? - Based on end user needs, the vendor could than select valid envelope combinations out of his perspective[6].
  ⇨ Would allow for good comparability also.

Role of reference methods:

- Their importance varies for different technology fields, e.g. important for site characterisation/monitoring technologies
- The comparison with existing systems/technologies always strengthens acceptance of performance results[7]

What is the role of existing developer/vendor data prior to the design (quality assurance)?

- They should to be considered to save time and cost, but quality assurance is mandatory to keep the ETV system credible.
  ⇨ As an optimum solution demonstration projects would collect and report their data in an ETV compatible way, so that they can be fed into the ETV process.

Topic 5 Verification Phase

Reference site testing

- Microbiological tests are difficult at a reference site, if the set up already exists for a certain time (adaptation)
- Heterogeneity is difficult to be rebuilt.
- Accuracy is an important point for monitoring devices to be verified
- Would stakeholders accept longevity simulation in reference scale?
  ⇨ Only if scaling laws are well understood there might be a chance.
  ⇨ Is modelling accepted?

Field site testing:

- Contractors/consultants want to see results from field tests.[8]
  ⇨ Comment: A successful field test can only show, that a technology is able to work for one very specific set-up/ field site, which is out of a nearly infinite number of possible

[4] by Tim Hart, Cybersense
[5] by Divyesh Trivedi, NICOLE
[6] by Christian Gron, DHI
[7] by Willem van Bommel, City of Rotterdam
[8] by Tim Hart, Cybersense

site conditions. This always has to be kept in mind when decision makers select a technology based on a few reference applications.

Monitoring of tests:

- What type of monitoring do we need to verify that is actually related to remediation?
  - ⇨ Performance monitoring is essential[9], wherever possible links to national (e.g. NL, UK) or international protocols exist.
  - ⇨ It is necessary to proof that the design implementation is made properly (soft skills of the testers!).

How to combine/assess technology and engineering (hardware and software) (due to uniqueness of each site situation):

- Could be by verifying the technology design, available procedure and engineering.
- How does a vendor suggest to adjust his technology to a site specific underground and contamination situation.
  - ⇨ Comparable to ISO 9000 or 14000 quality assurance procedures but in addition with a proof of technology principle of the specific technology.
  - ⇨ Via this approach there could also be a link to earlier considerations of longevity aspects[10].

What could be the link to BATNEEC (Best Available Technology Not Entailing Excessive Costs)?

- This question has to be specifically considered within the project.

Topic 6 Assessment Phase

Consultation as part of the Assessment

- Regional consultation should be taken into account where appropriate only, as in many cases regional/local stakeholders will otherwise influence the results without expertise.

Reference methods

- Agreement on reference methods is a key point for assessing of monitoring technologies.
  - ⇨ Laboratory methods are the benchmark for monitoring technologies, we need to compare all field methods to this benchmark, everyone will accept this[11].
  - ⇨ A performance based reference method would be a step forward but this would not find acceptance at this time. Nonetheless if the EC-ETV would be able to set such kind of performance based ref. method, this would at the end set the right pace and standard.

[9] by Robert Stuut, Fugro
[10] by Divyesh Trivedi, NICOLE
[11] by Tim Hart, Cybersense

This would of course be a market advantage of Europe over the US, Japan, Canada etc.[12]

- For remediation technologies this topic is of minor importance, except for technology fields where "reference technologies" are lined out by market acceptance.
  - ⇨ We have to go with what industry accepts as benchmark for our reference method!! -> market acceptance of reference methods is most important.[13]
- The method has to be able to prove the claim. We have to find a balance between technological sound and market accepted ETV.

How to deal with verification runs that don't meet the claim?

- The assessment should lead to advice and identification of the weak points of a technology and should even help redefining the claim.
- The question on the publication of failures was controversial, for sure the issue will depend on the funding scheme.
- Vendors see problems for ETV if it does not judge at the end.
- Re-emphasizing: an adjustable/downgrade of the claim after the testing should be possible.[14]

Topic 7 Ex post

Publication of verification results

- The public verification report (PVR) should report on the main results of the verification.
- The system has to be transparent, at least the actual status of all on-going and former procedures should be reported.

The ETV label

- Should be a registered label that ties the public verification report to the claim description.

CEN Workshop agreement (CWA)

- A CWA will set a pre-standard. Though the workshop as agreement procedure is internationally open, it will finally be the European community that will dominate the CWA-pre-standard, like the PROMOTE stakeholder group. It can actually be a big advantage that Americans and others will than follow the agreement set by the European approach[15].

[12] by Tim Hart, Cybersense
[13] by Tim Hart, Cybersense
[14] by Ludo Diels, VITO
[15] by Divyesh Trivedi, NICOLE

Topic 8 Summary

PROMOTE is focussing on the verification of site characterisation/monitoring and remediation technologies for soil and groundwater.

Technology verification can be described by the following means:

- ⇨ Technology performance data are checked by an authorized 3rd party
- ⇨ Pre-specified technology verification protocols are used.
- ⇨ Successful verification usually delivers an independent proof that the technology performance claim of the technology developer is correct.

A European environmental technology verification system ETV should allow a technology, once it is verified, to speed up and ease its market acceptance in the EU-27.

The verification procedure is characterised by four phases:

1. Application phase
2. Design phase
3. Test/Verification phase
4. Assessment phase

I Application Phase

- Keep low bureaucracy and stay cost efficient.
- Provide multiple and easy to access entry points
- Take care of approaches in very rare technology fields
- Keep in mind accreditation and certification structures for the verification design
- Be aware of defining an accurate and testable claim.

II Design Phase

- Be pragmatic, do not try to address everything possible.
- Test labs should be relevant and appropriate in terms of market recognition and technology expertise.
- Claims have to be evaluated in terms of available tests/methods.
- Potentially standard requirements of national or other end user groups on the design have to be accepted.
- IPR/ protection has to be considered.

III Verification Phase

- Elements that determine the site specific performance of an application are the technology (hardware) and the engineering (how to design a most efficient technology operation)

- At least for remediation technologies both elements (technology and engineering) have to be part of the verifcation.
- Monitoring layout to proof that a technology is working experiences of the vendor?
- The Verification for remediation technologies will stay complex:
  - ⇨ how to adjust a technology to a particular site in a standardised way?
  - ⇨ all parameters considered relevant have to be defined
  - ⇨ site specific technology engineering has to be part of the verification
  - ⇨ vendor should be open to redefine his claim after verification tests
  - ⇨ Technology/concept and design/application/performance must be combined
- Verification of technology combinations have to be considered
- Longevity
  - ⇨ Distinguish between contaminant degradation/fixation technologies
  - ⇨ Performance longevity
  - ⇨ Sustainability longevity (Problematic e.g. on stabilisation technologies)
  - ⇨ ETV can only provide circumstantial evidence on long term performance as based on certain boundary conditions. The clarification of these conditions is an important issue for claim definition.
- Reference site/field site
  - ⇨ Reference site testing for monitoring/site characterisation is very useful form most claims. It should be followed by field verification where reference site testing does not sufficiently proof a claim
  - ⇨ For remediation technologies field scale is most important reference site testing is appropriate for verifying the technology principle

IV Assessment Phase

- Reconfirmation with stakeholders could be part of the assessment
- Not meeting claims has to be handled carefully
- Reference methods have to be clearly defined (primarily monitoring technologies)
- For remediation technologies the reference is what industry/end users accept as benchmark.

V Ex post ETV

- The public verification report PVR should report on the main results of the verification.
- The ETV label should be registered and linked to the PVR
- The CEN Workshop agreement is a well suited tool to develop a common understanding on technology verification

Figure 3: Summary of the most important stakeholder comments