

PROPOSALS FOR A EUROPEAN FRAMEWORK FOR ENVIRONMENTAL MONITORING

Stuart Newstead
Environment Agency, UK

ABSTRACT

National environmental legislation in European Union Member States (MSs) is largely based on European Directives. MSs are currently putting in place their national arrangements for implementing the Integrated Pollution Prevention and Control (IPPC) Directive. The monitoring of industrial process emissions and environmental quality are key aspects of effective regulation and protection of the environment. A considerable amount of work is being done in various quarters to establish best practice and standards for environmental monitoring. Of particular relevance is the work of IMPEL: the EU Network for the Implementation and Enforcement of Environment Law on exchanging information between environmental authorities on inspection and monitoring; the European IPPC Bureau on exchanging information between MSs on compliance monitoring; the European Commission on the implementation of the European Pollutant Emission Register; the EUROAIRLAB Network of reference institutes in promoting harmonisation and comparable air emissions measurements; EMMTAP: an EC funded project to develop a model training and accreditation programme for the European air pollution monitoring industry; and the Comité Européen de Normalisation (CEN) in defining measurement standards. A European framework within which these outputs could be integrated and put into practice is proposed based on Europe-wide certification arrangements.

1 INTRODUCTION

Emissions monitoring is a rapidly growing activity. It is driven to a large extent by increasing regulatory demands. Across the European Union this will be given another stimulus by the implementation of the European Directive on Integrated Pollution Prevention and Control (IPPC) [1]. These regulatory drivers have a common aim of protecting the environment.

An essential first step to understanding and improving the environment is to have indicators which will describe the state of the environment. Ambient air monitoring provides one of a range of techniques for achieving this. These techniques can then be used to determine whether the environment is staying the same, improving or deteriorating. The latter may be caused by pressures such as industrial emissions. Decisions then need to be taken on the means to prevent or minimise the pressures and prevent environmental harm from occurring. If regulators are to make informed, quality decisions these have to be based on reliable facts. These facts include monitoring data that the regulators, industry and the public can have confidence in.

Many decisions, eg the determination of the "Best Available Techniques" to be used under IPPC are increasingly being taken on a European basis. If they are to be successful then monitoring data from a wide variety of sources across Europe must be reliable and comparable. A considerable amount of disparate work is being done by IMPEL, EIPPCB, EPER, EUROAIRLAB and CEN which is relevant to realising these objectives. This paper summarises this work. It proposes the establishment of a European Framework, based on Europe-wide certification arrangements, to build on the outputs from this work and ensure their effective and practical implementation.

2 IMPEL

IMPEL is the European Union Network for the Implementation and Enforcement of Environmental Law [2]. It is an informal Network of the environmental authorities of the Member States (MSs) of the European Union. The European Commission is also a member of IMPEL and shares the chairmanship of management meetings.

It promotes the exchange of information and experience, and the development of greater consistency of approach in the implementation, application and enforcement of environmental legislation, with special emphasis on Community environmental legislation. It provides a framework for policy makers, environmental inspectors and enforcement officers to exchange ideas, and encourages the development of enforcement structures and best practices.

IMPEL attaches great importance to environmental inspections and monitoring. They are a key activity in the implementation and enforcement of environmental law, and are essential to secure a high level of protection. In February 1999 IMPEL published a report which described the regulatory requirements for operator self-monitoring [3]. Self-monitoring is developing into an important regulatory approach. The IPPC Directive provides for permits to define the requirements of a compliance monitoring programme to be undertaken by the operator. It is important to understand that self-monitoring does not constitute self-regulation. Self-monitoring provides additional information on which the competent authorities can judge whether an operator is complying with relevant legislation and conditions of permits. The competent authorities remain responsible for assessing compliance and enforcing environmental legislation. The report:

- reviews the benefits, scope and legal considerations relevant to operator self-monitoring regimes;
- provides guidance on formulating statutory requirements and the role of the competent authorities;
- focuses mainly on measurements of emissions, but it also recognises the need to monitor the process, management systems and organisation of an installation;
- provides guidance on the drafting of statutory requirements for self-monitoring to minimise possibilities for fraud, negligence and misunderstanding on the part of the operator;
- provides guidance on the role of the competent authorities in approving operators' monitoring programmes, specifying standards and quality requirements, inspecting operators' self-monitoring arrangements and undertaking a proportionate amount of independent monitoring.

In order to ensure that self-monitoring provides reliable data, the competent authorities must specify standards and quality requirements. The report states that this may best be achieved by working with other bodies such as standards organisations or accreditation bodies to establish a quality measurement infrastructure.

Currently IMPEL has two further projects underway on "Best Practice in Compliance Monitoring" and "Guidelines on Diffuse VOC Emissions".

The project report on "Best Practice in Compliance Monitoring" should be published during 2001. This project has focussed on developing common principles and practical advice on measuring emissions and on using the results to check compliance with numerical limits. In particular the practical regulatory aspects of measurement and interpretation of results have been addressed. The report will provide guidance on the following six key stages for planning and implementing best practice in compliance monitoring:

Stage 1: Reasons for monitoring:

- formal requirements, eg laws, regulations, permits;
- enforcement actions, eg inspection plans, improvement plans, prosecutions;
- spin-off benefits, eg data for: emission inventories, assessing Best Available Techniques, assessing environmental impacts, emissions trading.

Stage 2: Responsibility for monitoring:

- who should undertake monitoring, eg operator, competent authority, use of contractors;
- quality safeguards eg inspection/auditing of plans, use of standard methods, accredited/certified instruments, personnel and laboratories;

- assignment of responsibility eg ensuring clarity in responsibilities by means of permits and other legal means.

Stage 3: Monitoring aspects of limit setting

- clarity in limits eg limits are expressed in such ways that measurements can be used to assess compliance, legal/formal basis of monitoring,;
- clarity in monitoring requirements eg locations, timescales/timing, practical considerations;
- monitoring techniques eg sampling and analysis, automatic monitoring systems, use of surrogates, remote sensing, ecotoxicological techniques, pollutant/parameter, standard methods;
- units eg concentration, mass, accounting periods;
- interpretation and compliance evaluation criteria eg statistical considerations;
- reporting requirements eg what has to be held on site or sent to the competent authority, formats, auditable trails;
- quality requirements eg calibration, maintenance, accreditation/certification.

Stage 4: Principles of practical monitoring

- planning and carrying out monitoring eg choice of methods, timescales/timing,;
- frequency eg continuous or periodic monitoring;
- relevant information eg process and environmental conditions, surrogates;
- safety eg risk assessments;
- quality requirements eg fit for purpose, QA/QC, calibration, accreditation/certification.

Stage 5: Interpretation of monitoring data

- compliance assessment eg data requirements, numerical /statistical comparisons with limit values;
- determination of compliance zones eg statistical considerations related to measurement uncertainties at the limit value;
- regulatory responses eg graduated according to degree of compliance/non-compliance.

Stage 6: Reporting of monitoring results

- purpose eg legislation, environmental performance, evidence, inventories, emissions trading, charging;
- responsibilities for reporting eg operator, competent authority;
- scope of reports eg standard formats, comprehensive or summary, statistical data;
- coverage eg individual installation, industrial sector, geographical.

These key stages are recognised as being highly interdependent because the quality achieved at each stage affects what can be achieved at all later stages. Attention is required to this ‘quality chain’ in order to avoid any ‘weak links’ which might otherwise render reported results invalid.

The project report on “IMPEL Guidelines on Diffuse VOC Emissions” should also be published during 2001. This project has focussed on developing guidance to improve the monitoring, licensing and inspection of diffuse VOC emissions from industrial activities [4]. The report includes a review of emission estimation and reduction methods. It is based on an EU wide inventory, hands-on experience with emission measurements and a comparison with US EPA-guidelines and practice in USA.

3 EIPPCB

The European IPPC Bureau in Seville exists to catalyse an exchange of technical information on best available techniques under the IPPC Directive and to create reference documents (BREFs) which must be taken into account when the competent authorities of MSs determine conditions for IPPC permits. IPPC will apply to a wide range of industrial activities and the objective of the information exchange exercise is to assist the efficient implementation of the Directive across the European Union. The BREFs will inform the relevant decision makers about what may be technically and economically available to industry in order to improve their environmental performance and consequentially improve the whole environment.

The Bureau has established a Technical Working Group on monitoring. However, monitoring is seen as a horizontal or cross-cutting topic and therefore not suited to a BAT reference document as it is not intended to specify the best monitoring techniques. Rather, the TWG is exchanging technical information with a view to the Bureau publishing a report on ‘Monitoring General Principles’. This report will be focussed on providing guidance to permit writers who are drafting monitoring requirements in IPPC permits. The report will include consideration of:

- different monitoring methods including reference to a list of CEN standards;
- frequency of emissions monitoring;
- source emissions, fugitive emissions and exceptional emissions (eg start-up and shut-down);
- data production chains for the media: air, water, waste, soil, etc;
- use of surrogate parameters;
- assessment of monitoring data for compliance with numerical limits in permits;
- reporting of monitoring data;
- monitoring costs.

4 EPER

A Commission Decision on the implementation of a European Pollutant Emission Register (EPER) according to Article 15 of the IPPC Directive and to be referred to as the EPER Decision, was adopted on 17 July 2000 [6]. The EPER will be a publicly accessible register with emission data that enables the Commission and national governments to monitor the trends in annual emissions of the large industrial activities subject to regulation under IPPC. The EPER will also enhance the awareness of the public to influence the performance of industry. Based upon available data from MSs and estimations made by the EC, reported data for approximately 20,000 facilities are expected to be included in the register. This is about the same number as submit reports to the Toxic Release Inventory in the USA.

In accordance with the EPER Decision the EC has published a document: “Guidance Document for EPER Implementation” [7]. The Guidance Document is the official guideline of the European Commission that facilitates MSs to fulfil the reporting requirements of the EPER Decision without changing any of the actual requirements of the EPER Decision. The Guidance Document addresses details of the EPER Decision on reporting requirements and formats, and includes sector-specific sub-lists of pollutants for source categories and reference to emission estimation methods.

It is the responsibility of the MSs to establish the reporting requirements for industry and the methodologies to be used. Three methodologies for determining emissions are allowed:

Class M – measurement using standardised or accepted methods

Class C – calculation using nationally or internationally accepted estimation methods and emission Factors

Class E – non-standardised estimation derived from best assumptions or guesses.

The Guidance Document on EPER Implementation provides an indicative list as guidance to MSs of measurement methods for relevant air pollutants covered by CEN and ISO standards.

5 EUROAIRLAB

EUROAIRLAB is a European Network of reference institutes for air emissions measurements [7]. The Network comprises the leading institutes from Denmark, Italy, France, Germany, The Netherlands and the United Kingdom.

The NETWORK's objectives are to:

- develop further statistical methods to realise comparability of air emission measurements;
- expand its membership to include all the present and new MSs of the European Union;
- offer services to promote harmonisation and comparable measurements by all institutes dealing with air emission measurements in the European Union by acting as reference institutes creating the necessary infrastructure.

The NETWORK's Members achieve these objectives by:

- exchanging information;
- distributing knowledge outside of the Network through conferences, seminars, workshops and publications;
- providing information to measuring institutes, governmental organisations, standardisation and accreditation bodies;
- co-ordinating activities and developments of common projects;
- developing and providing training courses.

6 EMMTAP

EMMTAP is an EC project funded under the "Leonardo da Vinci" action programme for the implementation of an EC vocational training policy. The project will define the knowledge and skills of engineers and technicians who carry out emission and air quality monitoring measurements according to the requirements of a range of European Directives. It is intended that training organisations will use the outputs to design and deliver training courses, and that regulators will use the outputs to develop a personnel certification scheme to form the basis of a European CEN Standard.

A review of the current availability of environmental monitoring training packages has been completed. The project is now working up criteria for the following elements of a possible competency standard :

- Health and safety;
- Operation of equipment;
- Data processing;
- Purpose of measurement;
- Quality management;
- Process knowledge;

- Pre-sampling reconnaissance visits;
- Method selection;
- Sampling location / frequency;
- Protocol development ;
- Reporting;
- Experience / competence.

The project is due to report in April 2001.

7 CEN

The principle purpose of the Comité Européen de Normalisation (CEN) is to produce standards which are uniform in nature throughout the EU thereby enabling trade and the acceptance of information etc to proceed within the single market without hindrance. CEN facilitates the uniform application of current best technology and expertise, by drawing on the views and expertise of the member countries, and formulating or adopting standards which must then be implemented by all members.

The work of CEN is carried out by expert committees, consisting of representatives from the national standards organisations of European member countries, and other national experts.

Greater status has been given to European Standards by the EU's "New Approach to Technical Harmonisation and Standards" which was agreed in 1985. The resulting "New Approach" Directives set out fundamental requirements across a range of interests including the environment. The EC may mandate CEN to prepare European Standards (ENs) to which the New Approach requirements would refer. Harmonisation is likely to be a significant target of CEN work in the future.

CEN are very active in developing standards for both measuring air emissions and ambient air quality by both "manual" and instrumental methods. Several working groups are addressing the fine detail of these measurement methods. A working group (WG19 Emissions Monitoring Strategy)) is developing a standard concerning "general requirements for the competence of stack emission testing laboratories". This is based on an elaboration of EN ISO 17025 : General requirements for the competence of testing and calibration laboratories. An ad-hoc group is also recommending that CEN establish a new working group to develop European standards for the certification of automatic monitoring systems.

8 PROPOSALS FOR A EUROPEAN FRAMEWORK

All of this excellent and complementary work will, in time, provide the key building blocks to establish a quality measurement infrastructure. If the objectives of having reliable and comparable monitoring data across Europe are to be realised then this infrastructure should be established on a EU wide basis. However, this infrastructure will not come about of its own accord. Deliberate action will have to be taken and for such a European framework would be required. For this to succeed it would have to be well founded and supported by all the key stakeholders. It would be based on a quality measurement infrastructure which would need the harmonisation of :

- performance standards and conformance testing requirements for automatic monitoring systems;
- methods for measuring the emissions of all pollutants of regulatory interest;
- laboratory proficiency testing schemes;
- data interpretation and compliance assessment procedures;
- third party accreditation and certification arrangements which are mutually acceptable by all MSs;
- protocols for reporting compliance monitoring results and annual emissions.

CEN Standards would be the primary building blocks. Several existing and some new standards under development define the way in which certain pollutants should be measured. Others, under development will define the performance standards and conformance testing requirements for instruments, the competency

standards for personnel and organisations (test-houses). More would probably be needed until such time as national standards are no longer necessary and the growing scope of regulatory interests have been met.

However, declared adherence to CEN Standards alone will not provide a basis for mutual acceptance of monitoring instruments, personnel and organisations across national boundaries. Arrangements are required within which mutual acceptance can operate without recourse to repeat conformance testing or other means of gaining acceptance separately by each of the competent authorities in each MS. These arrangements can be most easily satisfied by existing agreements governing third party accreditation and certification. The EN 45000 series of European standards already specifies the general requirements to be met by Certification Bodies if they are to gain accreditation from national Accreditation Bodies. In turn accreditation provides for mutual acceptance through work being done to harmonise national accreditation and assessment procedures across Europe via the European Accreditation Collaboration (EA). In this way it would be open to an instrument manufacturer or a monitoring person to gain a certification from any Certification Body and a monitoring organisation to gain accreditation from any Accreditation Body in any MS and know that they would be recognised throughout the EU.

Although many of the essential building blocks are or will shortly be available much detailed work would be necessary to establish an authoritative framework which would command the support of all stakeholders. For example the potential for conformance testing of instruments, and assessment of personnel and organisations to develop along different lines in MSs would be real. Established ways of working, legal considerations, cultural differences etc. would all have to be addressed. In order to achieve this the key stakeholders would have the following important roles to play:

- the competent authorities would have the lead role. They would need to:
 - agree harmonised approaches to compliance monitoring and reporting,
 - define, in consultation with other stakeholders, the requirements for a quality measurement infrastructure which was fit for purpose and within which the Accreditation and Certification Bodies would operate.
- CEN would need to produce standards to meet the range of regulatory needs and requirements of the quality measurement infrastructure;
- The EUROAIRLAB national reference institutes would need to lead within their national monitoring communities to promote the requirements of the quality measurement infrastructure.

9 CONCLUSIONS

The establishment of a European Framework for environmental monitoring would provide the following benefits:

- an EU-wide quality measurement infrastructure;
- reliable and comparable environmental monitoring data across the EU;
- a 'one-stop-shop' for third party accreditation/certification;
- commercial benefits to instrument manufacture and service providers by avoiding trade barriers within the single market and providing support in the world-wide commercial market.

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10 REFERENCES

- [1] Council Directive 96/61/EC Concerning Integrated Pollution Prevention and Control. OJ No L257, 10 October 1996, p26
- [2] Internet web site <http://europa.eu.int/comm/environment/impel>
- [3] IMPEL Network. European Union Network for the Implementation and Enforcement of Environmental Law. Operator Self-Monitoring. February 1999

- [4] Reinoud J K van der Auweraert. IMPEL Guidelines on Diffuse VOC Emissions CEM 2001
- [5] Secretariat of EUROAIRLAB, Mr Ente Sneek, KEMA Power Generation and Sustainables PO Box 9035, 6800 ET Arnhem, The Netherlands
- [6] Official Journal of the European Communities. Reference 2000/479/EC.
- [7] European Commission. Guidance Document for EPER Implementation. November 2000 ISBN 92-894-0279-2

Author

Stuart Newstead
Head of the National Compliance Assessment Service
Environment Agency
Cameron House
White Cross Industrial Estate
South Road
Lancaster LA1 4XQ
United Kingdom

Tel: ++44 1524 581 910
Fax: ++44 1524 581 908
E-mail: stuart.newstead@environment.agency.gov.uk

Stuart Newstead has worked for the Environment Agency and its predecessor regulatory authorities in England for 16 years. He manages the National Compliance Assessment Service (NCAS) which provides technical support on compliance assessment activities as part of the Agency's regulatory functions under environmental protection legislation. This includes the on-going development of the Agency's Monitoring Certification Scheme: MCERTS. He is also the Convenor for CEN Working Group 19 on Emissions Monitoring Strategy and the ad-hoc CEN working group on Instrument Certification .