

EXPERT GROUP ON TECHNO-ECONOMIC ISSUES FOR THE REDUCTION OF EMISSIONS OF SO₂, NO_x, NMVOC AND PM

Nadine ALLEMAND¹, Bernd CALAMINUS², Franck DELACROIX³, Michael BALL²,
Pierre KERDONCUFF², Sonia SAMBAT¹, Julien VINCENT¹.

¹ CITEPA : Interprofessionnal Technical Centre for Studies on Atmospheric Pollution, 10 Rue du faubourg Poissonnière, 75015 Paris, France ; phone : 00 33 1 44 83 68 83 ; fax : 00 33 1 40 22 04 83 ; email : nadine.allemand@citepa.org

² IFARE : French-German Institute for Environmental Research , Hertzstrasse 16, 76187 Karlsruhe, Germany ; phone : 00 49 721 608 45 82 ; fax : 00 49 721 758 909 ; email : bernd.calaminus@wiwi.uni-karlsruhe.de

³ADEME : French Agency for Environment and Energy Management, 2 Square Lafayette, 49004 Angers, France ; phone : 02 41 20 41 20 ; fax : 02 41 87 23 50 ; email : franck.delacroix@ademe.fr

I INTRODUCTION

In the framework of the Convention on Long Range Transboundary Air Pollution (LRTAP) adopted under the aegis of the Economic Commission for Europe of United Nations (UNECE), work will have to be carried out for the revision of the Gothenburg Protocol. At its seventeenth session (28/11/01 to 03/12/01), the executive body of the Convention decided to set up a working group on emission reduction techniques and their costs. France, represented by the French Ministry of Ecology and Sustainable Development (MEDD) and French Agency for the Environment and Energy Management (ADEME), leads this Expert Group on Techno-Economic Issues. Its chairman is Mr Bouscaren, former director of CITEPA. ADEME financially supports the programme and ensures the technical management of the project. ADEME is helped to run the EGTEI programme by CITEPA (Interprofessionnal Technical Centre for Studies on Atmospheric Pollution) and IFARE (French-German Institute for Environmental Research). These two organizations ensure the secretariat of EGTEI.

EGTEI reports to the WGSR (Working Group of Strategies and Reviews).

EGTEI has been entrusted with the following tasks :

- 1 provide the secretariat of the expert group,
- 2 provide an overview of available databases and models for controlling emissions from stationary and mobile sources that are relevant to the work of the expert group,
- 3 in collaboration with the task force on Integrated Assessment Modelling and CIAM (Centre for Integrated Assessment Modelling) develop and support the application of transparent methodologies to derive input data for IAM :
 - a) propose and make available a practical method and tool for describing emission control options and remaining potential sectoral control,
 - b) disseminate the method to Parties and provide documentation on and support for its application, organise a user workshop,
 - c) validate national data in collaboration with national experts and identify differences between countries,
 - d) evaluate uncertainties,

- e) provide support to countries for providing validated input data for generating cost curves, conduct reference studies on selected countries
- 4 promote, develop and update techno-economic databases.

The aim of this paper is to present the state of progress of EGTEI activities.

II DEVELOPMENT OF THE DATABASES ON COSTS OF EMISSION REDUCTION TECHNIQUES

The working programme implemented for EGTEI has involved :

- developing working documents which present for each sector studied , the reduction costs of primary and/or secondary measures. These documents present in detail the procedure used in each sector to estimate costs. Both investments and operating costs are considered and the documents provide the methods of cost estimation in a transparent way. The documents also contain default cost values based on default values for parameters influencing operating costs (energy costs, wages, ...);
- developing a computer tool, ECODAT, aimed at managing the large number of parameters and data needed for cost calculation, at enabling the collection of country specific data by Parties and at calculating country-specific costs on the basis of the methods developed.

The method derived for the estimation of costs provides :

- default costs presented in the working documents and in the computer tool, based on parameters which are defined as European averages . These costs are provided by the secretariat;
- the definition of country-specific costs easily calculated with ECODAT, based on country-specific parameters defined by national experts nominated by member countries.

The development of working documents takes into account the following constraints :

- necessity, as far as possible, to develop a simple methodology even if complex sectors have to be represented,
- concertation with industry in order to reach consensus on the definition of costs and the representation of sectors.

Meetings bringing together experts from industries (see European organisations hereafter), institutional experts (representative of MEDD, ADEME and/or national experts) and the secretariat have been organised to discuss cost data.

The objective of the consultation with industry is to achieve the best compromise between the simplicity of the approach and the best possible description of reduction techniques and their associated costs.

Criteria which guide the choice of the method developed for the estimation of costs are :

- significant improvement compared to the present description of the sector in Integrated Assessment Modelling (IAM),

- availability of necessary statistical data as input for IAM.

About 50 activities/sectors have been initially selected in cooperation with IAM developers covering mainly the following categories :

- sources that emit NMVOC, concerned by the EU directive 1999/13 on emissions of NMVOC from certain uses of solvents.
- combustion in industry,
- industrial processes emitting PM;
- wood combustion in domestic appliances,
- off-road sources.

Sectors covered by EGTEI are presented in table 1, which presents the activities already finalised and activities for which work is still ongoing.

Numerous industry associations have participated on a voluntary basis in the definition of costs, in cooperation with the secretariat; among these are for example :

ACEA : European Automobile Manufacturers Association ;

ACEM : European Association of the Motorcycle Industry ;

AHLSSEN/HOLCIM ;

ATILH : Technical Association for Hydraulic Binder Industry ;

BLIC : European Association of the Rubber Industry ;

CEFIC : European Chemical Industry Council ;

CEPE : European Association of the Paint, Printing Ink and Artists' Colours Industries ;

CEMBUREAU : European Cement Association ;

CONCAWE : Oil Companies, European Organisation for Environment, Health and Safety ;

CTTN : Centre Technique de la Teinture et du Nettoyage ;

DOW FRANCE S.A.S ;

CPIV : European Glass Industry Council ;

ECCA : European Coil Coating Association ;

ERA : European Rotogravure Association ;

EUMEPS : European manufacturers of EPS ;

EUROMOT : European Association of Internal Combustion Engine Manufacturers ;

EURELECTRIC : Union of the Electricity Industry ;

EUROMETAUX : European Association of Non Ferrous Metals ;

EUROPEAN CONFEDERATION OF WOODWORKING INDUSTRIES ;

FEDOIL : Seed Crushers and Oil Processors Federation ;

INTERGRAF : International Confederation for printing and allied Industries ;

SAINT GOBAIN ;

SCHOTT GLAS ;

SICOS : French Association of the Organic Chemistry and Biochemistry Industries ;

SNPA : French Association of Foam Manufacturers ;

UIC : French Association of the Chemical Industry ;

UNIC : Italian Association of the Leather industry ;

UNITECH Annemasse.

EGTEI proposals for a large number of activities related to VOC emissions, off-road sources, on road sources and some other data have been already considered in the Integrated Assessment Model RAINS.

III DEVELOPMENT OF THE COMPUTER TOOL ECODAT

A computer tool ECODAT has been developed taking into account the following constraints :

- maximum compatibility with conditions encountered in Parties (hardware, software),
- structure allowing to represent the number of sectors and the details required,
- user friendliness,
- simple and open architecture but modular in order to allow regularly updates and improvements,
- english as language.

Figure 1 presents the entrance screen of ECODAT and the country-specific parameters used for France that differ from default values provided by ECODAT.

The screen copy in figure 2 presents the example of offset printing and French activity data for each size of installations from 2000 to 2020. The activity is expressed in tonnage of ink consumed in each range of installation size.

All sectors that are presently finalised in working documents are incorporated in ECODAT.

Figure 3 presents some specific developments carried out for some sectors to help experts in defining costs. The example of glass industry is provided.

IV ROLE OF NATIONAL EXPERTS

20 Parties to the Convention have nominated an expert to participate in EGTEI on a totally voluntary basis.

Experts are invited to support EGTEI in defining costs but mainly to define their own specific costs, based on the use of working documents, and to complete the ECODAT database.

The flow of data is presented in figure 4 :

- Steps 1 to 3 : EGTEI prepares the working documents in collaboration with industry, and develops the computer tool accordingly.
- Step 4 : following validation by industry, documents and ECODAT are transmitted to national experts.
- Step 5 : national experts complete the database with country specific parameters (costs of energy, of wages...) and parameters on activity levels from 2000 to 2020 (in five year steps) as well as the rate of use of the different reduction techniques.
- Steps 6 and 7 : country-specific data are transmitted to EGTEI which itself transmits them to the Centre of Integrated Assessment Modelling (CIAM, at IIASA, Laxenburg) after checking.

V SPECIFIC CASE STUDIES

The data base completion with country specific data is a difficult and ambitious task. A complete exercise has been carried out for France. The French national expert - with the help of EGTEI - has completed the data base. The structure of the data collection implemented is as follows :

1 On the basis of working documents, data proposals are made to industry. The data concerns :

- activity levels from 2000 to 2020. The French national expert directly determines the activity levels on the basis of relevant economic indicators or of data provided by industry.. MEDD ensures the global coherence between all scenarios developed at national level (energy scenarios especially),
- share of reference installations from 2000 to 2020 by five year steps,
- rates of application of reduction techniques in each activity from 2000 to 2020, following especially the implementation of legislation,
- the applicability factors of reduction techniques.

2 Documents are submitted to industry for consultation during a certain period of time,

3 After validation of data by industry they are introduced in the data base,

4 The data are transmitted to CIAM.

Data collected have been the basis for bilateral consultation carried out in January 2004 between CIAM and the French authorities in the scope of the CAFE programme.

The exercise of database completion has been fully and successfully carried out for France. Lessons learned from the exercise are that significant resources have to be allocated to complete the data base. On the other hand, exchanges concerning emission reduction potentials and associated costs are facilitated.

VI CONCLUSIONS

Since EGTEI has been set up, much progress has been made in improving the definition of costs for emission reduction techniques. A computer tool ECODAT is available for the definition of country-specific costs and the overall management of numerous parameters. EGTEI proposals for a large number of activities related to VOC emissions, off-road sources, on road sources and some other data have been already considered in IAM. A valuable dataset has been generated and collected by EGTEI and made available to CIAM as input data for the RAINS model used for the calculation of the baseline scenario under the CAFE programme. The data base ECODAT has been fully completed for France. Other Parties have provided data but not always in the structure requested by ECODAT. For France, data provided through ECODAT have been considered during bilateral consultation between CIAM and French national experts in the beginning of the year 2004 in the context of the CAFE baseline definition.

One of the objectives of EGTEI was to improve transparency and accuracy of techno-economic data used in IAM to more realistically represent the actual situation of emitting sectors and control options. These objectives can be considered to have been achieved for a certain number of sectors. Good cooperation between the Expert Group and industry has allowed a more realistic assessment of abatement potentials for several sectors.

It would be necessary in the future to encourage participation of experts from Parties not represented in the Expert Group or not active, in particular from countries with economies in transition.

EGTEI should be considered as a long term programme that will enable the continuous progress towards a better representation of costs.

Working documents and the ECODAT computer tool are available on the following web site :

http://www.citepa.org/forums/egtei/egtei_index.htm

Table 1 : Activities covered by EGTEI finalised or under development at the end of June 2004.

(SNAP (Selected Nomenclature for Atmospheric Pollutant) codes used for emission inventories are provided)

Sectors still in progress at the end of June 2004 :

0101 combustion in public power plants < 500 MW

0102 combustion in district heating plants < 500 MW

0104 combustion in solid fuel transformation plants < 500 MW

090201 incineration of municipal wastes

020101 and 0202 commercial and institutional plants except wood appliances and solid fuel combustion in small appliances

0301 combustion in boilers, gas turbines and stationary engines in industry < 500 MW

030301 + 0402 sinter and pelletizing plants + processes in iron and steel plants

030304 primary lead production

030306 primary copper production

030312 lime production

0103 + 0401 petroleum refineries (for NO_x + SO₂ + PM and VOC)

040401 sulfuric acid production

040405 production of ammonium nitrate/calcium nitrate

Sectors finalized :

0101, 0102, 0104, 0301 combustion in installations > 500 MW

020101 and 0202 wood appliances and solid fuel combustion in small appliances

030311 cement industry

030314 + 15 glass industry

040402 nitric acid

0405 organic chemical industry: steam cracking, PVC production, downstream units

050503 fuel distribution – service stations

060101 car coating

060202 vehicle refinishing

060103-04 architectural and domestic use of paints

060105 coil coating

060107 wood coating

060108 truck coating, bus coating, winding wire coating, other industrial application of paints

060201 surface cleaning

060202 dry cleaning

060304 polystyrene processing

060305 rubber processing

060306 specialty organic chemical industry

060307+08+09 manufacture of paints, glues, inks

060313 leather coating

060311+060405 industrial and non industrial uses of adhesives, manufacture of shoes,

060403 printing industry : offset printing, publication rotogravure, packaging, ...

060404 fat, edible and non edible oil extraction

07 road transport, mopeds and motorcycles

0803 to 0809 : all off-road sectors : Inland waterways, maritime, agriculture, forestry, industry household and gardening off-road engines.

Figure 1 : First screen copy of ECODAT (left) and France country specific data different from default values



Figure 2 : Example of the offset printing and level of activity expressed in tonnage of ink used in France (version of 30/12/03)

Sector selection

Select country: France
 Select emission sector: Solvent use
 Select RAINS sector: Printing, offset
 Select SNAP/Reference installation: 06 04 03
 Select fuel: NOF

NFR code: 3D
Printing industry

List of Reference installations

Select	No.	Description	Capacity	Unit
<input checked="" type="checkbox"/>	1	Small Reference installation, 1 small press	30	t
<input checked="" type="checkbox"/>	2	Medium Reference installation, 2 small presses	100	t
<input checked="" type="checkbox"/>	3	Large Reference installation, 4 large presses	400	t
<input checked="" type="checkbox"/>	4	Very Large installation, 8 large presses	1000	t

Activity levels of Reference installations

No.	Activity 2000 [t ink]	Activity 2005 [t ink]	Activity 2010 [t ink]	Activity 2015 [t ink]	Activity 2020 [t ink]
1	166.2	188.0	212.7	212.7	212.7
2	4,015.3	4,542.9	5,140.0	5,140.0	5,140.0
3	8,556.8	9,681.0	10,953.4	10,953.4	10,953.4
4	1,107.7	1,253.2	1,417.9	1,417.9	1,417.9
Sum:	13,846,0	15,665,1	17,724,0	17,724,0	17,724,0

Back Import/Export RAINS sector Techno-economic datasheet Calculate inventory Sector overview

(Off-road) Print Help

Figure 3 : Example of an EXCEL sheet integrated to ECODAT to help experts (example of glass industry)

Sector Selection

Select country: France

Select emission sector: Industrial processes (incl. inorganic chemical industr

Select RAINS sector: Glass production (flat, blown, container glass)

Select SNAP/Reference installation: Single pollutant NOx

Select fuel: NOF

NFR code: Single pollutant NOx

List of Reference installations

Select	No.	Description	Capacity	Unit
<input checked="" type="checkbox"/>	1	Glass production, Natural gas, European average (NOx)	60000	t
<input checked="" type="checkbox"/>	2	Glass production, Heavy fuel oil, European average (NOx)	60000	t

Activity levels of Reference

No.	Activity 20
1	20,0
2	10,0
Sum:	30,0

Excel Sheets

All available Excel Sheets in Egtei Directory

Description	Filename
Glass Sector	help topics for glass sector.xls
Off Road	help for off road.xls

Activity 2020

Activity 2020
20,0
10,0
30,0

Buttons: Back, Import/Export RAINS se, Open, Back, Help, (Offroad), Print, Help

Microsoft Excel - help topics for glass sector

Help to provide the activity levels on Reference Installations (t glass melted / year)

Input parameters

	2000	2005	2010	2015	2020
Natural gas consumption in the whole glass sector	[GJ]				
Heavy fuel oil consumption in the whole glass sector	[GJ]				
Total quantity of glass produced in the whole glass sector	/t				

Calculated activity level (t glass melted/year)

Reference installation	2000	2005	2010	2015	2020
1	0	0	0	0	0
2	0	0	0	0	0

Figure 4 : global organisation of the EGTEI work and role of national experts

