

**State of progress in the work of the  
Expert Group on Techno-Economic Issues  
(EGTEI)  
Technical Annexes  
to the Gothenburg Protocol**

**Unofficial documents**

The technical annexes have been delivered to WGS&R 44, as first release, in electronic and printed form, with the purpose of receiving preliminary comments and further guidance from the Parties, in view of the official submission of these annexes, along with the guidance documents, to WGS&R 45, September 2009.

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## 1 Introduction

The mandate for EGTEI is provided in the document ECE/EB.AIR/2008/9 ECE/EB.AIR/WG.5/2008/12/Rev.1 of 24 September 2008: 2009 WORKPLAN FOR THE IMPLEMENTATION OF THE CONVENTION point 1.6 TECHNO-ECONOMIC ISSUES<sup>1</sup>:

Description/objectives: To explore further best available techniques (BAT) for emission abatement, including their efficiencies and costs; to continue to develop a techno-economic database (ECODAT) and methodologies for evaluating uncertainties; and to draw up draft revisions of techno-economic items in annexes to protocols.

Main activities and time schedule: The Expert Group on Techno-economic Issues, with France and Italy as lead countries, will:

- (a) Initiate work on proposals to revise annexes IV, V and VI to the Gothenburg Protocol<sup>2</sup>, specifying limit values for sulphur, nitrogen oxides and VOCs for stationary sources, as well as annex VIII for mobile sources; carry out preparatory technical work to address the requirement in article 3, paragraph 7, of the Protocol to consider limit values for the VOCs content of products not included in annex VI or VIII, with a view to adopting an annex; and carry out work on drafting an annex on limit values for emissions of PM (PM<sub>2.5</sub> and PM<sub>10</sub>) from stationary sources;
- (b) Revise the guidance documents<sup>3</sup> associated with the Gothenburg Protocol on sulphur, nitrogen oxides and VOCs, and add PM to the guidance documents (in consultation with the Task Force on Heavy Metals<sup>4</sup>);
- (c) Report on progress to the forty-third, forty-fourth and forty-fifth sessions of the Working Group on Strategies and Review;
- (d) Cooperate with the European Integrated Pollution Prevention and Control Bureau for the revision of BAT reference documents for the steel, glass and possibly cement industries, mainly on cost issues”.

This paper describes the state of progress of EGTEI work:

- on the revision of the guidance documents;
- on proposals to revise technical annexes IV, V, VI, VIII;
- on suggested emission limit values (ELVs) for the VOCs content of products not included in annex VI or VIII;
- on drafting an annex on ELVs for PM (PM<sub>2.5</sub> and PM<sub>10</sub>) from stationary sources.

In order to avoid restricting WGSR's flexibility alternative options for ELVs are presented for consideration.

In order to achieve the goals fixed by the Executive Body, work to revise technical annexes and guidance documents began in the second half of 2008. A special working group led by Finland has been set up to make proposals for ELVs from stationary engines to be included in an updated technical annex V and developed a chapter of the guidance document on this matter.

The work of preparing the guidance documents and technical annexes was organized as follows:

- First versions of guidance documents and technical annexes were prepared by the EGTEI secretariat by the end of September 2008,

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<sup>1</sup> ECE/EB.AIR/2008/9 - ECE/EB.AIR/WG.5/2008/12/Rev.1 of 24 September 2008  
<http://www.unece.org/env/documents/2008/EB/EB/ece.eb.air.2008.9.e.pdf>

<sup>2</sup> The 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone  
[http://www.unece.org/env/lrtap/multi\\_h1.htm](http://www.unece.org/env/lrtap/multi_h1.htm)

<sup>3</sup> Guidance documents to Protocol adopted by decision 1999/1  
<http://www.unece.org/env/documents/1999/eb/eb.air.1999.2.e.pdf>

<sup>4</sup> Task Force on Heavy Metals in 2004. Led by Germany, the Task Force addresses the technical needs of the reviews and assessments required by the 1998 Aarhus Protocol on Heavy Metals  
<http://www.unece.org/env/lrtap/TaskForce/tfhm/welcome.htm>

- The work plan and schedule for the exchange of information within the group, receiving comments from experts on draft documents, and the delivery of updated versions of documents, was agreed at the 14<sup>th</sup> EGTEI meeting in Sorrento<sup>5</sup>, Italy, on 13 and 14 October 2008,
- Due to the large amount of information provided in the guidance documents and technical annexes, comments by national and industry experts continued to arrive up to mid January 2009, despite the secretariat having requested comments by the end of November 2008,
- Revisions of the guidance documents and technical annexes were prepared by the EGTEI secretariat by mid February 2009, and a second comment round was completed by the beginning of March 2009,
- A third revision of the technical annexes was prepared by the EGTEI secretariat for a meeting held in Paris on the 17 March 2009 to prepare provisional technical annexes for the 44<sup>th</sup> WGSR meeting of 20 to 23 April 2009,
- Third versions of guidance documents and technical annexes will be prepared by the EGTEI secretariat by the end of March 2009 for discussion at the 15<sup>th</sup> EGTEI meeting in Rome from 6 to 7 April 2009,
- Final versions of technical annexes and guidance documents are to be provided to UNECE by the 20 May 2009.

This iterative process of drafting and revising guidance documents and technical annexes in light of comments received, has enabled EGTEI to better anticipate the range of technical issues the WGSR may wish to discuss during the 44<sup>th</sup> and 45<sup>th</sup> WGSR meetings. The initial drafts only included one option for ELVs, the revised documents offer 3 alternative approaches for setting ELVs (refer to chapter 4 for definitions) so as not to restrict the WGSR's technical options.

Experts contributing to these proposals come from the following organisations:

- The Netherlands: InfoMil, the Dutch Ministry of Environment
- Austria: Austrian Umweltbundesamt - UBA
- Belgium: Flemish Government - Environmental Department
- Germany: German Umweltbundesamt - UBA
- France: ADEME, French Agency for Environment and Energy Management
- Sweden: Swedish Environment Protection Agency
- United Kingdom: DEFRA
- Finland : Finnish Environment Institute
- Switzerland: Swiss Federal Office for the Environment, BAFU
- Norway: Norwegian Pollution Control Authority, SFT
- Czech Republic: Ministry of the Environment
- European commission – DG Enterprise
- EUROFER: European Confederation of Iron and Steel Industries
- EUROMETAUX: European Association of Metals
- CERAME UNIE: European Ceramics Industry
- ECCA: European Coil Coating Association
- EUROMOT: European Association of Internal Combustion Engines Manufacturers

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<sup>5</sup> Report of the 14th meeting of the Expert Group on Techno-economic Issues  
 ECE/EB.AIR/WG.5/2009/2 - <http://www.unece.org/env/documents/2009/EB/wg5/wgsr44/ece.eb.air.wg.5.2009.2.e.pdf>

- EURELECTRIC: Association of the Electricity Industry in Europe
- VGB: Federation of the Owners of Large Boilers (**V**erband der **G**roßkessel-**B**esitzer e. V., VGB)
- IPPC alliance : CEMBUREU : European Cement Association ; CERAME-UNIE : European Ceramics Industry ; CPIV : Standing Committee of the European Glass Industries ; ECGA: European Carbon and Graphite Association ; EURO ALLIAGES: comité de liaison des industries de Ferro-Alliages, EUROFER : European Confederation of Iron and Steel Industries ; EUROMINES and IMA: Industrial Minerals Association.
- CEFIC: The European Chemical Industry Council
- CEPE: European Council of Producers and Importers of Paints, Printing inks and Artists' Colours
- ESA: European Sulphuric Acid Association
- ETRMA: European Tyre & Rubber Manufacturing Industry
- ESIG: European Solvents Industry Group
- CONCAWE: The Oil Companies European Association for Environment, Health and Safety in refining and distribution

## **2 State of progress for the proposals of revised guidance documents and technical annexes**

### **2.1 Guidance documents**

EGTEI was tasked with revising the 3 guidance documents in the current Gothenburg Protocol and, as mandated, with adding details of control techniques for dust emissions and of ways of reducing the solvent content of products. These existing guidance documents were developed on a pollutant per pollutant principle:

- Guidance document I on the control techniques for emissions of sulphur from stationary sources,
- Guidance document II on the control techniques for emissions of nitrogen oxides from stationary sources,
- Guidance document III on the control techniques for emissions of volatile organic compounds (VOCs) from stationary sources.

The addition of new pollutants and the characteristics of reduction techniques and activities means, however, that an activity oriented guidance document would be a better approach. Consequently, a single guidance document is now proposed covering sulphur, NO<sub>x</sub>, VOCs and dust emissions from stationary sources. The activity oriented structure of the new guidance document better enables a consideration of possible synergies and trade-offs between reduction techniques and technologies.

The proposed guidance document, entitled "Guidance document on control techniques for emissions of sulphur, NO<sub>x</sub>, VOCs, dust (TSP, PM<sub>10</sub> and PM<sub>2.5</sub>) from stationary sources", covers the four pollutants above and all activities previously covered by the existing guidance documents attached to the Gothenburg Protocol for SO<sub>2</sub>, NO<sub>x</sub> and VOCs as well as the activities in annex II of the Aarhus Protocol<sup>6</sup> for abating heavy metal emissions for dust.

The structure of the new guidance document in preparation and activities covered are provided in annex 1. The summarized structure is as follows:

- Chapter I: Introduction,
- Chapter II: General issues for the 4 pollutants,
- Chapter III: General issues for sulphur emissions,
- Chapter IV: General issues for NO<sub>x</sub> emissions,
- Chapter V: General issues for VOC emissions,
- Chapter VI: General issues for dust emissions (TSP, PM<sub>10</sub> and PM<sub>2.5</sub>),
- Chapter VII: Sectoral chapters (1 to 42).

<sup>6</sup> 1998 Aarhus Protocol on Heavy Metals - [http://www.unece.org/env/lrtap/hm\\_h1.htm](http://www.unece.org/env/lrtap/hm_h1.htm)

The third version of the guidance document is due for completion by the end of March 2009 ready for discussion at the 15<sup>th</sup> EGTEI meeting in Rome from 6 to 7 April 2009. Forty five activities are covered (sub chapters 7.1 to 7.45. See annex I). 39 activities have already been subject to exchange of information between EGTEI members and the EGTEI Secretariat, the remaining three activities are still to be developed.

## 2.2 Technical annexes

EGTEI is mandated to revise the following technical annexes (TA):

Technical annexes of the current Gothenburg Protocol	Technical annexes (TA) of the [new] Gothenburg Protocol
TA I critical loads and levels	Not done by EGTEI
TA II emission ceilings	Not done by EGTEI
TA III designed pollutant emissions management area	Not done by EGTEI
TA IV Limit Value (LV) for Sulphur emissions from stationary sources	<b>Proposal for updated TA IV LV for Sulphur emissions from stationary sources</b>
TA V LV for NO <sub>x</sub> emissions from stationary sources	<b>Proposal for updated TA V LV for NO<sub>x</sub> emissions from stationary sources</b>
TA VI LV for VOC emissions from stationary sources	<b>Proposal for updated TA VI LV for VOC emissions from stationary sources</b>
TA VII Time scales under article 3	Not done by EGTEI but possible recommendations to be done by EGTEI
TA VIII LV for fuel and new mobile sources	<b>Proposal for updated TA VIII ELV for fuels and new mobile sources</b>
TA IX measures for the control of NH <sub>3</sub> emissions from agriculture	Not done by EGTEI
	<b>Proposal for a new TA X LV for dust emissions</b>
	<b>Proposal for a new TA XI LV for solvent content of products</b>

A third revision of the proposed technical annexes, for discussion at the WGSR, was completed on the 9 April 2009, following comments from EGTEI members; these proposals should, nevertheless still be considered provisional.

The list of activities covered by the current technical annexes attached to the Gothenburg Protocol for sulphur, NO<sub>x</sub> and VOCs has not been extended, as was decided in 2007 following the review of existing technical annexes made by EGTEI<sup>7</sup>.

For dust, EGTEI has considered both activities covered by:

<sup>7</sup> Preparation of the review of the Annexes IV, V and VIII of the 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to the 1979 Convention on Long-range Transboundary Air Pollution - Final draft prepared by the Expert Group on Techno-economic Issues (EGTEI) for consideration by the WGSR at its fortieth session in September 2007

- Annex V of the Aarhus Protocol on heavy metals, setting up ELVs for dust and heavy metals,
- Activities covered by the document “assessment of technical developments: BAT and limit values of April 2006” prepared by the Task Force on Heavy Metals and submitted to the UNECE Convention on LRTAP
- Certain relevant dust emitters not linked to heavy metal emissions.

Activities and pollutants for which ELVs are suggested in technical annexes IV, V, VI, X and XI are as follows:

	SO <sub>2</sub>	NOX	TSP	VOC	Technical annexes (GP for Gothenburg Protocol or AP for Aarhus Protocol on Heavy Metals) previously concerned	Proposals of Technical Annexes for the [new] Gothenburg Protocol
Sulphur content of gasoil	Y				GP technical annexe IV for SO <sub>2</sub>	Proposal of updated annex IV for SO <sub>2</sub>
Combustion plants > 50 MWth Boilers and process heaters	Y	Y	Y		GP technical annex IV for SO <sub>2</sub> GP technical annex V for NOx	Proposal of updated annex IV for SO <sub>2</sub> Proposal of updated annex V for NOx
Combustion plants > 50 MWth Gas turbines		y	Y		AP, annex V for particulate matter and heavy metals only solid fuels	Proposal of new annex X for dust All types of fuels
Stationary engines		Y			GP technical annex V for NOx	Work of the sub group engines to update the annex V for NOx
Mineral oil and gas refineries	Y for Claus plants		Y		GP technical annex IV for SO <sub>2</sub> and Claus plants	Proposal of updated annex IV for SO <sub>2</sub> for Claus plants Proposal of new annex X for dust for the different furnaces such as FCC
Production of iron and steel (Primary and secondary production - sinter plants, pelletisation plants, blast furnaces, basic oxygen steel making plant, casting)		Y	Y		GP technical annex V for NOx for new and existing sinter plants AP, annex V for particulate matter and heavy metals for sinter plant, pellet plants, blast furnaces, electric arc furnaces	Proposal of updated annex V for NOx  Proposal of new annex X for dust for major dust sources in iron and steel production (primary and secondary processes)
Ferrous metal processing industry (rolling mills...)			Y		Not considered	Proposal of new annex X for dust
Non ferrous metal processing industry (primary and secondary Al production, primary and secondary Pb production, primary and secondary Zn production and other large non ferrous metals)			Y		AP, annex V for particulate matter and heavy metals for production of lead, zinc, and copper	Proposal of new annex X annex X for dust for major dust sources in these activities (primary and secondary processes)
Titanium Dioxide	Y				GP technical annex IV on SO <sub>2</sub> for titanium dioxide	Proposal of updated annex IV for SO <sub>2</sub>
Cement production		Y	Y		GP technical annex V for NOx AP, annex V for particulate matter and heavy metals	Proposal of updated annex V for NOx Proposal of new annex X for dust
Glass manufacturing industry			Y		AP, annex V for particulate matter and heavy metals	Proposal of new annex X for dust

Ceramics manufacturing industry			Y		Not considered	Proposal of new annex X for dust
Paper pulp production			Y		Not considered	Proposal of new annex X for dust
Nitric acid ...		Y			GP technical annex V for NOx	Proposal of updated annex V for NOx
Domestic waste and industrial waste incineration			Y		AP, annex V for particulate matter and heavy metals	Proposal of new annex X for dust
Wood processing			Y		Not considered	Proposal of new annex X for dust
Storage and distribution of petrol				Y	GP annex VI for VOCs	Proposal of updated annex VI for VOC
Adhesive coating Footwear manufacture Other adhesive applications				Y	GP annex VI for VOCs	Proposal of updated annex VI for VOC
Wood and plastic lamination				Y	GP annex VI for VOCs	Proposal of updated annex VI for VOC
Car coating Truck cabin coating Truck and van coating Bus coating				Y	GP annex VI for VOCs	Proposal of updated annex VI for VOC
Coating processing in various industrial processes				Y	GP annex VI for VOCs	Proposal of updated annex VI for VOC
Coil coating				Y	GP annex VI for VOCs	Proposal of updated annex VI for VOC
Dry cleaning				Y	GP annex VI for VOCs	Proposal of updated annex VI for VOC
Manufacturing of coatings, varnishes, inks and adhesives				Y	GP annex VI for VOCs	Proposal of updated annex VI for VOC
Printing processes				Y	GP annex VI for VOCs	Proposal of updated annex VI for VOC
Production of pharmaceutical products				Y	GP annex VI for VOCs	Proposal of updated annex VI for VOC
Solvent content of products				Y	Not considered	Proposal of new annex XI on the solvent content of products (paints)

A special working group, led by Finland, was set up to suggest ELVs for stationary engines,

EGTEI is also compiling data with a view to making proposals for the revision of annex VIII related to mobile sources, both road vehicles and off road vehicles – this work is being carried out with the help of DG Enterprise. The proposals for updating annex VIII will have links to the European legislation, where necessary, in order to keep only tables with ELVs in the text, as it is now. The proposed ELV will correspond to the most recent regulation stages implemented in the EU depending on the type of engines considered.

EGTEI has worked only on section A of technical annexes related to Parties other than Canada and United States of America and not on section B related to Canada and the United States of America. Both Canada and the USA were invited to contribute to the revision.



### 3 Proposals for improvement of definitions to be used in the Protocol

A series of proposals for definitions has been prepared by EGTEI in order to support the revision of the Protocol.

#### 3.1 *Pollutants covered by the Protocol*

##### 3.1.1 Sulphur

In the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone<sup>2</sup>, sulphur is defined as follows:

“Sulphur” means all sulphur compounds, expressed as sulphur dioxide (SO<sub>2</sub>).

The [new] guidance document addresses the control of oxidized sulphur emissions considered as the sum of sulphur dioxide (SO<sub>2</sub>) and sulphur trioxide (SO<sub>3</sub>), expressed as SO<sub>2</sub>.

##### 3.1.2 NO<sub>x</sub>

In the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone<sup>2</sup>, NO<sub>x</sub> are defined as follows:

“Nitrogen oxides” means nitric oxide and nitrogen dioxide, expressed as nitrogen dioxide (NO<sub>2</sub>).

EGTEI suggests using nitrogen monoxide instead of nitric oxide in the Protocol just to avoid possible confusion with definition used in the guidance document and technical annexes based on nitrogen monoxide.

The [new] guidance document provides the following general information:

The guidance document addresses the control of NO<sub>x</sub> emissions considered as the sum of nitrogen monoxide (NO) and nitrogen dioxide (NO<sub>2</sub>) expressed as NO<sub>2</sub>.

The proposal in the updated technical annex V will provide the following general information:

The technical annex V addresses the control of NO<sub>x</sub> emissions considered as the sum of nitrogen monoxide (NO) and nitrogen dioxide (NO<sub>2</sub>) expressed as NO<sub>2</sub>.

##### 3.1.3 VOCs

In the 1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone<sup>2</sup>, VOCs are defined as follows:

“Volatile organic compounds”, or “VOCs”, means, unless otherwise specified, all organic compounds of an anthropogenic nature, other than methane, that are capable of producing photochemical oxidants by reaction with nitrogen oxides in the presence of sunlight.

As it was already done in the existing Gothenburg Protocol<sup>2</sup>, EGTEI suggests having additional definitions in the technical annexes IV and XI, to be consistent with EU regulation ELVs suggested refer to.

The following definitions are used in the proposal of updated technical annex VI:

“Volatile organic compound (VOC) shall mean any organic compound having at ~~273.15 K~~ 293.15 K a vapour pressure of 0.01 kPa or more, or having a corresponding volatility under the particular conditions of use. The fraction of creosote which exceeds this value of vapour pressure at 293.15 K shall be considered as a VOC”.

“Organic compound shall mean any compound containing at least the element carbon and one or more of hydrogen, halogens, oxygen, sulphur, phosphorus, silicon or nitrogen, with the exception of carbon oxides and inorganic carbonates and bicarbonates”.

“Organic solvent shall mean any VOC which is used alone or in combination with other agents, and without undergoing a chemical change, to dissolve raw materials, products or waste materials, or is used as a cleaning agent to dissolve contaminants, or as a dissolver, or as a dispersion medium, or as a viscosity adjuster, or as a surface tension adjuster, or a plasticiser, or as a preservative”.

273.15 K was used in the current guidance document<sup>3</sup> attached to the Gothenburg Protocol. EGTEI suggests 293.15 K to be consistent with the definition used in the Directive 1999/13/EC on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations<sup>8</sup>.

The following definitions are used in the proposal of new technical annex XI:

“Volatile organic compound (VOC) shall mean any organic compound having an initial boiling point less than or equal to 250°C measured at a standard pressure of 101.3 kPa”.

“Organic compound shall mean any compound containing at least the element carbon and one or more of hydrogen, oxygen, sulphur, phosphorus, silicon, nitrogen, or a halogen, with the exception of carbon oxides and inorganic carbonates and bicarbonates”.

“Organic solvent shall mean any VOC which is used alone or in combination with other agents to dissolve or dilute raw materials, products, or waste materials, or is used as a cleaning agent to dissolve contaminants, or as a dispersion medium, or as a viscosity adjuster, or as a surface tension adjuster, or as a plasticiser, or as a preservative”.

This definition is suggested by EGTEI in order to be consistent with the definition used in the Directive 2004/42/EC on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain paints and varnishes and vehicle refinishing products and amending Directive 1999/13/EC<sup>9</sup>

EGTEI decided that the definition of VOCs provided in the US federal Register 40 CFR Part 51.100, “All carbon compounds, except CO, CO<sub>2</sub>, carbonic acid, carbures and metal carbonates and ammonium carbonate, which participate to photochemical reactions” is not inconsistent with the definition used by UNECE.

### 3.1.4 Dust

In the document “options for revising the Gothenburg Protocol, ECE/EB.AIR/WG.5/2009/4”, PM are defined as follows:

Particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub> and TSP (total suspended particulate matter)) means:

- PM<sub>2.5</sub>: The mass of particulate matter that is measured after passing through a size-selective inlet with a 50 per cent efficiency cut-off at 2.5 µm aerodynamic diameter;
- PM<sub>10</sub>: The mass of particulate matter that is measured after passing through a size-selective inlet with a 50 per cent efficiency cut-off at 10 µm aerodynamic diameter;
- TSP: the mass of particles, of any shape, structure or density, dispersed in the gas phase at the sampling point conditions which may be collected by filtration under specified conditions after representative sampling of the gas to be analyzed, and which remain upstream of the filter and on the filter after drying under specified conditions;

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<sup>8</sup> Council directive 1999/13/EC of 11 March 1999 on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations – OJEC L85.

<sup>9</sup> Directive 2004/42/EC of the European parliament and of the Council of 21 April 2004 on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain paints and varnishes and vehicle refinishing products and amending Directive 1999/13/EC – OJEC L143.

EGTEI supports this definition but has also used the term 'dust' in the guidance document because it is synonymous with TSP and is widely used in EU legislation and international standardisation.

### **3.2 Options for expressing ELVs for dust**

The ELVs suggested in the proposal for a new technical annex X refer to dust. According to EGTEI, it is premature to define ELVs expressed as PM2.5 and/or PM10 as there is insufficient data of adequate quality on which to base them. Furthermore, the added value of additional ELVs for PM2.5 and PM10 is not clear as mass emission levels of PM2.5 and PM10 will automatically be reduced by setting an ELV for dust. Measuring/monitoring of PM2.5 and PM10 is possible following prEN ISO 23210-1 using manual techniques but emission levels are not comparable with the automatic methods in use for dust. As in ECE/EB.AIR/2008/4<sup>10</sup>, reporting of PM10 and PM2.5 emissions should be encouraged.

### **3.3 Best Available Technique definition**

EGTEI reviewed the definition of BAT used in the current guidance documents attached to the Gothenburg protocol. A point 12 has been added related to the point 12 used in the recast of IPPC directive<sup>11</sup>. Point 12 refers to information published. However a slightly different definition for point 12 is suggested by EGTEI compared to the one used in the IPPC recast.

"Best available techniques" means the most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing the basis for emission limit values (and other permit conditions) designed to prevent and, where that is not practicable, to reduce emissions and the impact on the environment as a whole:

- (a) "techniques" includes both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned,
- (b) "available" techniques means those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced inside the Member State in question, as long as they are reasonably accessible to the operator,
- (c) "best" means most effective in achieving a high general level of protection of the environment as a whole.

Criteria for determining BAT are as follows:

1. The use of low-waste technology;
2. The use of less hazardous substances;
3. The furthering of recovery and recycling of substances generated and used in the process and of waste, where appropriate;
4. Comparable processes, facilities or methods of operation which have been tried with success on an industrial scale;
5. Technological advances and changes in scientific knowledge and understanding;

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<sup>10</sup> Guidelines 2008 for reporting emission data under the Convention on Long Range Transboundary air pollution (Note by the Working Group on Strategies and Review, ECE/EB.AIR/2008/4, 23 September 2008  
<http://www.unece.org/env/documents/2008/EB/EB/ece.eb.air.2008.4.e.pdf>

<sup>11</sup> Proposal for a Directive of the European Parliament and of the Council on industrial emissions (integrated pollution prevention and control) (Recast) [COM(2007) 843 final] [SEC(2007) 1679] [SEC(2007) 1682] /\* COM/2007/0844 final - COD 2007/0286  
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0844:FIN:EN:HTML>

6. The nature, effects and volume of the emissions concerned;
7. The commissioning dates for new or existing installations;
8. The length of time needed to introduce the best available technique;
9. The consumption and nature of raw materials (including water) used in the process and energy efficiency;
10. The need to prevent or reduce to a minimum the overall impact of the emissions on the environment and the risks to it;
11. The need to prevent accidents and to minimize the consequences for the environment;
12. Information published by national and international organisations<sup>12</sup>.

According to EGTEI, this definition could be used either in the core text of the [new] Protocol or in the guidance document.

### **3.4 BAT AELs definition**

EGTEI suggests adding a definition of BAT Associated Emissions Levels (BAT AELs) as most of the data reported in the [new] guidance document refer to these levels, as defined in the BREFs documents.

- BAT AELs are levels that an operator can expect to achieve when using the BAT, and are appropriate reference points to assist in the determination of permit conditions,
- BAT AELs represent average emission levels achievable during a substantial period of time in normal operating and/or design conditions (well-proven technology),
- BAT AELs are neither emission nor consumption limit values.

BAT AELs are based on normal operating conditions and may vary with changing input materials or for varying outputs.

The BAT-AELs are based on a range of averaging periods and represents a typical load situation. Therefore, when taking account of BAT-AELs in the context of ELV setting, proper regard must always be given to the reference period to which the described BAT-AEL pertains. For peak load, start up and shut down periods, as well as for operational problems of the flue gas cleaning systems, short-term peak values, which could be higher, have to be regarded.

Where a level is described as "achievable" using a particular technique or combination of techniques, this should be understood to mean that the level may be expected to be achieved over a substantial period of time in a well maintained and operated installation or process using those techniques.

## **4 Options for ELVs**

### What EGTEI provides:

The mandate of EGTEI includes providing the WGSR with options for ELVs. It is anticipated that EGTEI proposals will be discussed during the 44<sup>th</sup> WGSR meeting from 20 April to 23 April 2009 and the 45<sup>th</sup> WGSR meeting in the early beginning of September 2009.

### Information available for defining options for ELVs:

For defining different options for ELVs, EGTEI has used:

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<sup>12</sup> On this item 12, Germany firstly proposed international organizations. This was insufficient for the Netherlands and it was decided during the EGTEI meeting of 17<sup>th</sup> March 2009 to complete with national information.

- ELVs that EGTEI members reported as currently being applied in their countries for the different activities covered by the current annexes IV, V, VI and proposed new annexes X and XI.
- ELVs present in the Gothenburg Protocol and the Aarhus Protocol on Heavy metals,
- The ELVs implemented according to existing EU Directives,
- The ELVs present in new EU directive proposals,
- Current guidance documents attached to the Gothenburg Protocol and annexe II of the Aarhus Protocol on Heavy Metals,
- The documents prepared by the Task Force on Heavy Metals<sup>13</sup>
- BREF<sup>14</sup> documents which provide a state of the art of BAT available per sector and their associated emission levels (BAT AELs).

#### Options for ELVs suggested by EGTEI:

The different options for ELVs now suggested by EGTEI correspond to different ambition levels. Options for ELVs are as follows:

- Option 1: ELV1 is a demanding but technically feasible option with the objective of achieving a high level of reduction. The ELV1 is based on a value between the lower and upper BAT AEL, (where it is available),
- Option 2: ELV2, while technically demanding, pays greater attention to the costs of the measures for achieving reduction. The ELV2 is a value based on the upper BAT AEL (where it is available),
- OPTION 3: ELV 3 represents current [good] practices based on the legislation of a number of Parties to the Convention.

Averaging periods are stated in [new] technical annexes: start up, shut down and maintenance periods are clearly excluded.

#### Technical opportunities for introducing great policy flexibility:

The WGSR may wish to consider the following technical means of introducing greater flexibility:

- Making a distinction between new and existing plants,
- Recognising regional differences in applicable technologies,
- Granting a longer period of time for existing plants to achieve compliance,
- Considering different plant characteristics (plant size, operational regime, remaining lifetime...),
- Using the bubble concept for some complex activities<sup>15</sup>,
- Setting different ambition levels according to the techno-economic situation of Parties.

<sup>13</sup> Background document: assessments of the technological developments: Best available technique (BAT) and limit values – TFHM – April 2006  
Options for updating BAT from a technical point of view and implications for annexes – Michael Suhr, German UBA- TFHM- London June 2008. [http://www.unece.org/env/lrtap/TaskForce/tfhm/Fifth%20meeting\\_London\\_docs/Michael%20Suhr\\_.pdf](http://www.unece.org/env/lrtap/TaskForce/tfhm/Fifth%20meeting_London_docs/Michael%20Suhr_.pdf)

<sup>14</sup> <http://eippcb.jrc.es/reference/>

<sup>15</sup> Limit values set on the emissions of the whole plant rather than imposing limits on individual units constituting the plant

## 5 Annexe 1: structure of the new guidance document

- 1 Introduction
- 2 Common general issues for the 4 pollutants
  - 2.1 Major sources
  - 2.2 Monitoring and reporting
  - 2.3 Energy management, energy efficiency, energy mix
- 2 General issues for Sulphur
  - 3.1 General issues
  - 3.2 Sulphur content of fuels
  - 3.3 Fuel switching
  - 3.4 Fuel cleaning
  - 3.5 Combustion Technologies
  - 3.6 Secondary measures - Flue gas desulphurisation processes
  - 3.7 Costs of reduction techniques of SO<sub>2</sub>
  - 3.8 By products and side effects
- 4 General issues for NOx
  - 4.1 General issues
  - 4.2 Fuel switching
  - 4.3 Fuel cleaning
  - 4.4 Primary measures
  - 4.5 Secondary measures
  - 4.6 Costs of NOx emission reduction techniques
  - 4.7 Side effects
- 5 General issues for VOCs
  - 5.1 General issues
  - 5.2 Knowledge of emissions and solvent management plan
  - 5.3 General approaches to reduce VOC emissions
    - 5.3.1 Primary measures
    - 5.3.2 Secondary measures
  - 5.4 Costs
  - 5.5 Side effects
- 6 General issues for dust
  - 6.1 General issues on dust
  - 6.2 Fuel switching
  - 6.3 Fuel cleaning
  - 6.4 Primary measures
  - 6.5 Secondary measures
  - 6.6 Costs of dust emission reduction techniques
  - 6.7 Side effects
- 7 Sectoral chapters

	<b>Sectoral chapters of the new guidance document</b>	<b>SO<sub>2</sub></b>	<b>NOx</b>	<b>Dust</b>	<b>VOC</b>
7-1	Small combustion installation < 1MW with domestic residential combustion installations included	Y	Y	Y	Y
7-2	Combustion installations from 1 to 50 MW (a) Boilers (b) Gas turbines	Y	Y	Y	Y
7-3	Combustion installations > 50 MW (a) Boilers (b) Gas turbines	Y	Y	Y	Y
7-4	Mineral oil and gas refineries for emissions of SO <sub>2</sub> , NOx and PM Combustion and furnaces (processes heaters, FCC, TCC)	Y	Y	Y	

7-5	Mineral oil and gas refineries Processes and sources of VOC				Y
7-6	Coke oven furnaces	Y	Y	Y	Y
7-7	Iron and steel production (iron and steel making in integrated steelworks (sinter plants, pelletization plants, blast furnaces and basic oxygen furnaces including continuous and ingot casting) and electric arc furnace steelmaking)	Y	Y	Y	Y
7-8	Ferrous metals processing iron foundries with a capacity exceeding 20 tonnes/day, as well as installations for "hot and cold forming", including hot rolling, cold rolling, wire drawing, installations for "continuous coating", including hot dip coating and coating of wire, and installations for "batch galvanizing"	Y	Y	Y	
7-9	Non ferrous metal processing industry (primary and secondary Al production, primary and secondary Pb production, primary and secondary Zn production and primary and secondary Cu production)	Y	Y	Y	
7-10	Cement production	Y	Y	Y	
7-11	Lime production	Y	Y	Y	
7-12	Glass production	Y	Y	Y	
7-13	Man made fibre production	Y	Y	Y	Y
7-14	Ceramics manufacturing industry	Y	Y	Y	
7-15	Paper pulp production	Y	Y	Y	
7-16	Nitric acid production	Y	Y	Y	
7-17	Sulphuric acid production	Y	Y	Y	
7-18	Waste incineration (domestic and industrial waste, waste water treatment sludge incineration)	Y	Y	Y	
7-19	Industrial wood processing			Y	
7-20	Offshore activities (petrol)				Y
7-21	Petrol distribution – from the Mineral oil refinery dispatch stations (petrol) to service stations including transport and depots (petrol)				Y
7-22	Other handling and storage (liquid fuels excluding petrol)				Y
7-23	Production of organic chemicals (excluding fine organic chemical production)				Y
7-24	Production of organic fine chemicals				Y
7-25	Adhesive coating (including footwear manufacture) General coating, shoe industry, lamination				Y
7-26	Coating processes 1 Manufacture of cars Manufacture of truck cabins, trucks Manufacture of buses and trailers				Y
7-27	Coating processes 2 Winding wire coating				Y
7-28	Coating processes 3 Coil coating				Y
7-29	Other coating processes 4 Other industrial coating				Y
7-30	Solvent content in products 1: Domestic and architectural paints				Y
7-31	Manufacturing of coatings, varnishes, inks and adhesives				Y
7-32	Printing processes (Packaging printing, cold set offset heat set offset, publication sector, screen printing)				Y
7-33	Rubber processing				Y
7-34	Dry cleaning				Y
7-35	Metal degreasing				Y
7-36	Vegetable oil and animal fat extraction and vegetable oil refining				Y
7-37	Vehicle refinishing				Y
7-38	Wood impregnation				Y

7-39	Solvent content in products 2: Domestic uses of solvent (other than paints)				Y
7-40	Beer production				Y
7-41	Titanium dioxide production	Y	Y	Y	
7-42	Stationary engines		Y		