SOLUTIONS
EUROPEAN SOLVENTS INDUSTRY GROUP

The Newsletter of the European Solvents Industry Group

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CAFE INVITES SOLVENT PRODUCERS AND USERS TO HELP SHAPE EMISSION POLICY

Air quality in Europe continues to receive a lot of attention. The Clean Air for Europe (CAFE) programme, an initiative launched in 2001 by the European Commission, was set up to address questions related to the future of European air quality. Its focus is to answer questions on what measures should be taken, and who should implement them.

CAFE has two fundamental objectives:

1. Collect information on air quality across the EU
2. Based on this information, put into place mechanisms to evaluate and generally improve air quality wherever and whenever needed

The CAFE programme provides solvent producers and users with an important opportunity to help shape policy that could affect the industry's near- and long-term future.

How does CAFE work?

The CAFE programme will lead to a "thematic strategy" (policy advice) in which the European Commission will set out recommendations for future air quality legislation over the next 10-20 years. The strategy is expected in 2005.

simulate the impact on air quality when various elements of inventories are modified. The "baseline scenario", based on the most recent data, is the first step in understanding the EU air quality equation.

The value of these simulations can only be as good as the validity of the model and the reliability of the data in the inventories. The partnership and dedication of industry in collecting data and reviewing its validity is therefore essential to establish useful baseline scenarios.

During 2004, the European Commission will also review the effectiveness of existing legislation and assess recent research on air pollution and its effect on human health. The goal is to determine what degree of policy implementation is still required at national level, what additional reductions in air pollutants are still needed to protect human health, and also the efficiency and the cost-effectiveness of current legislation. This will then be used to draw up and evaluate future proposals.

Industry's achievements in the field of emission reduction need to be assessed to help identify where and how future legislation should be implemented.

Legislation stemming from this strategy is expected to target further reduction in the emissions of ammonia (NH_3), sulphur dioxide (SO_2), and precursors of particulate matter and ozone (O_3), such as nitrous oxide (NO_x) and volatile organic compounds (VOCs). Since solvents are VOCs, the programme could result in further regulation of solvent emissions.

In early 2004, CAFE examined national emission inventories and, using the RAINS assessment model developed by the International Institute for Applied Systems Analysis (IIASA), established air quality indicators. The RAINS model allows the European Commission to generate "scenarios" that will

How can solvent producers and users provide input?

Scenarios

The data introduced into the RAINS model earlier this year produced an emission "baseline scenario" to generate forecasts for 2010, 2015 and 2020, with 2000 as the reference year. This simulation acts as the benchmark for different scenarios where certain elements can be modified e.g. when VOC emissions are reduced in one sector, what is the impact on air quality and is this the best method for reducing air pollution?

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Different scenarios are compared by analyzing the impact and economic cost of selected measures on air quality and human health. This cost-benefit analysis[1] methodology is being developed by independent contractor AEA Technology and is an essential tool to define the most appropriate and feasible EU policy. The solvent industry is providing technical expertise to the European Commission to ensure that the data used in the model is based on the latest scientific research and that the outcomes are truly applicable to targeted sectors. It is important that the results also reflect the impact on the competitiveness of the different industry sectors in the EU.

During the summer of 2004, IIASA and AEA Technology will jointly compare and analyse the outcome of the different scenarios. They will then recommend the specific scenario (i.e. levels of emission reduction, which sectors, reduction measures etc.) that would be most appropriate to improve air quality in Europe.

It is important that downstream solvent users provide input and validate the benchmark scenario so that the potential alternatives reflect the economic and scientific reality of their sector. The European Solvent VOC Group (ESVOCCG) is encouraging its members to provide this input in order to support only reduction measures that best serve the improvement of air quality and industry sustainability.

Ex-post evaluations

The complex scenario modelling work described above will be accompanied by two ex-post evaluations, i.e. assessments of the effectiveness of past air quality legislation and emission reduction programmes. Clearly, it would be beneficial to understand how existing legislation has improved air quality before deciding on what new legislation would be the most needed and most effective.

The first assessment will focus on the analysis of two parameters:

1. Efficiency of local and short-term measures already taken by EU Member States
2. Feasibility of similar future air quality measures

The second assessment analyses the efficiency of past legislation for the purpose of developing and proposing new policies. This, of course, implies that the results of existing legislation are already being felt and can already be evaluated.

In the framework of these ex-post evaluations, it would be important for solvent downstream users to provide information on specific national legislation or measures that they believe have contributed most to reducing solvent emissions over the past several years. The positive effects of legislation (e.g. the solvent emission directive, the recently adopted decorative paints and vehicle refinishing directive, development of effective abatement techniques, etc.) will only be fully apparent in the next several years, so for the moment they will have to be evaluated as best as possible before new legislation can be defined.

Conclusion

The scenarios and the combined assessments in the second half of 2004 will allow the Commission to start developing guidelines for its "thematic strategy". As ozone precursors, VOCs are being closely examined under CAFE. This could lead to revised legislation of solvent emissions. However, the CAFE programme provides an important opportunity for solvent producers and downstream users to input into a process that will not only define air quality legislation for the next decade, but potentially shape the legislative environment in which the industry must operate in future.

For more information on CAFE, please see the CAFE website, http://www.europa.eu.int/comm/environment/air/cafe/index.htm or contact Pierre de Kettenis at:
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You can also visit our website at www.esig.org

[1] *The CBA process is rather complicated and extensive for us to insist on here. We might address it in more details within one of our future issues.*

PROGRESS TOWARDS MORE EFFICIENT 'END-OF-PIPE ABATEMENT'

Incineration and solvent recovery are important techniques used to reduce volatile organic compound (VOC) in waste gas. This article introduces some recent developments that have improved the efficiency of these end-of-pipe abatement techniques.

VOC (solvent) incineration

Incineration to burn off VOCs has always been an energy intensive process. Heat exchangers and catalysts, have been used to reach the high temperatures required for incineration. However, this has proved insufficient.

A recent development in the form of regenerative oxidisers has provided a solution to the drawbacks of traditional methods. Before and after entering the incineration chamber, waste gases pass through large ceramic beds. These are initially heated. Once the system is at operating temperature, the VOCs will be eliminated during two phases:

- During the first pass through the ceramic beds (before incineration), gases pick up heat and thus enter the incineration chamber at almost incineration temperature.
- During the second pass (after incineration), the gases return heat to the ceramic beds, thus completing the cycle.

Example

gas through beds →	incineration →	gas through beds
(pick up heat)	(VOC destruction)	(return heat)

Although the basic system has been around for some time, recent technical improvements have greatly increased its efficiency. Today, less than 1 gram of VOC per cubic metre of air may be enough to run such installations without the need for additional fuel. Previously 2-3 grams of VOC were needed.

VOC (solvent) recovery

Recovering solvents from waste gases rather than destroying them is not an easy task. The best results have always been obtained when only a single solvent was in the waste gas, and preferably one that did not mix well with water and readily adhered to activated carbon. Recovery of mixtures of two or more solvents of necessity required more complex systems.

Research generated by industry into boosting solvent recovery is beginning to bear fruit. Nitrogen or hot air, rather than steam, is now used to separate solvents more efficiently from water in waste gases. Also, azeotropic mixtures (liquid and vapor phases have identical constituent concentrations) can now be separated by distillation at different pressures.

Although environmentally preferable, in general solvent recovery rather than incineration still requires a significantly higher investment. Therefore, it is currently only considered where large amounts of solvents provide economies-of-scale. However, ongoing industry-sponsored research and development hold out the promise that a solvent recovery solution for disposing of VOC may also be economically viable.

WHAT IS VOC REACTIVITY?

The reaction of a chemical in the atmosphere and its potential contribution to the formation of ground level ozone depends on its photochemical reactivity. Since this reactivity can vary from substance to substance, the question is open as to whether this is a factor that should be taken into consideration when implementing measures to improve air quality.

In Solutions #10, the following simplified equation on ozone formation was presented:
sunlight/heat + VOC + NOx = ground level ozone

To help understand ozone formation better, distinctions between different VOCs and their level of reactivity could be introduced as an additional criterion (i.e. which compounds react more, create more or less smog, and in which conditions are these VOCs at their most reactive?). Environmental progress may be achieved more efficiently if the reactivity of a chemical could be quantified. This could facilitate the selection of chemicals that are a safer choice for human health and the environment. However, it is important to understand the impact on health and safety as well as air quality in order to make informed decisions.

Two main indices have been developed to compare the reactivity of different VOCs:
- MIR (Maximum Incremental Reactivity) in the United States
- POCP (Photochemical Ozone Creation Potential) in Europe.

These indices can be compared to ODP (Ozone Depletion Potential) or GWP (Global Warming Potential) indices, which are used to compare the impact of products released into the atmosphere.

Could photochemical reactivity be an important factor to consider in the ozone equation?

In the United States, the Environmental Protection Agency (EPA) has applied the concept of reactivity to decide whether to regulate certain VOCs. Priority was given to controlling the more reactive compounds first. Compounds that were judged unlikely to contribute to ozone formation were designated as "negligibly" reactive and did not require emission controls.

However, the EPA's policy also acknowledges that several compounds of negligible photochemical reactivity have been identified or implicated as a cause of other adverse health effects. The policy states that in view of these circumstances, it would be inappropriate for the EPA to encourage or support increased use of these compounds. In 1997, California introduced legislation on aerosol coatings, with VOC limits based on MIR values, which allows the continued use of solvents when reducing ozone creation potential.

Photochemical reactivity is not the only element to take into account when reviewing how to reduce the environmental impact of chemicals. Photochemical reactivity may be an interesting additional factor which should be properly investigated[1] before it is taken into account as a basis for any decision.

ESIG is currently considering how VOC reactivity could be used to improve targeted emissions control and would welcome any views and opinions from all parties concerned.

To share information or opinions on this subject, please contact:

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1 "Development of a Reactivity Index for the control of the Emissions of Organic Compounds", UK Environment Agency Report (Authors: RG Derwent and N Nelson)

FIFTH ESIG SOLVENTS STEWARDSHIP AWARDS

Make sure to mark in your diary that the fifth Solvents Stewardship Awards will be held at the annual Responsible Care® Conference of Cefic (European Chemical Industry Council) in Rome on 15/16 November.

Developed by ESIG to promote and share best practice and continuous improvements in the use of solvents, the awards will be granted to companies that best demonstrate improvements in health, safety and environment aspects in their use of solvents. To enter, please download the application form from the ESIG website.

This year, ESIG will award prizes in two categories: Workplace improvement and Environmental improvement. In an additional category, the "special mentions", the jury will also present awards for the best submission from a Small and Medium Enterprise and an applicant based in one of the new EU Member States.

All entries will be considered by a panel of European and international experts specialising in environment, chemistry and enterprise policy.

If you require any additional information, please contact the ESIG secretariat.

Disclaimer : The illustrations on this page do not aim to represent any existing chemicals.

QUIZ

1. CAFE stands for which of the following?

a) Committee for Associations & Federations in Europe
b) Council for the Association of Fire-fighters in Europe
c) Clean Air for Europe
d) Community Action for Expatriates

2. What is CAFE intended to provide?

a) An understanding of the factors that may influence air quality in Europe and the measures required to improve air quality
b) New legislation that will further limit solvent emissions in Europe
c) An understanding of the competitiveness of different European industry sectors
d) A country-by-country analysis of the effectiveness of present legislation

3. How can solvent users help in the CAFE process?

a) De-localise industry to non-EU countries
b) Buy the CAFE manual and rigorously follow the VOC-reduction measures that it advocates
c) Understand the base case, and the potential alternatives, that CAFE presents as its starting point and inform ESVOCCG and the European Commission if they do not correspond to the technical and economic reality of solvent use in the sector
d) Do nothing, because input from solvent users is not relevant

4. What factors have made the reduction of end-of-pipe solvent emissions easier?

a) None, no reduction is possible
b) The economic cost of both vent incineration and solvent recovery has fallen sharply
c) The use of new additives that increase the boiling point of common solvents so they are not vented
d) New pipe design and materials of construction reduces the volume of gases that can be vented

5. Photochemical reactivity is....

a) The tendency for colour bleed and loss of definition when digital photographs are printed on home computers
b) A measure of the speed at which X-ray devices can plot and scan the subject
c) The name of the chemical reaction that occurs in plants to consume atmospheric carbon dioxide and release oxygen into the air
d) The ability of a VOC chemical to react in the atmosphere and, therefore, a measure of its contribution to ground-level ozone

6. A potential use for the concept of photochemical reactivity is to provide....

a) A definitive classification of all solvents
b) A further tool to enable the proper, science-based evaluation of best options for Air Quality improvement
c) The basis for a single piece of legislation that would ban selected solvents based solely on their reactivity
d) A justification for the use of carcinogenic, mutagenic or reprotoxic solvents in some applications

Answers

ANSWERS: 1.C; 2.A; 3.C; 4.D; 5.D; 6.B;

CALENDAR

July-December
Dutch Presidency of the European Union

July 5
CAFÉ programme - Stakeholder Workshop on Cost-Benefit Analysis (see article page no.1)

July 20-23
European Parliament – approval of the new President of the Commission and the new working structure

August 22-27
13th World Clean Air and Environmental Protection Congress and Exhibition - London

September 1-2
Commission workshop "Improving Air Quality in the enlarged EU: Workshop on Plans and Programmes of Air Quality and National Emission Ceilings Directives"

September
CAFÉ programme: stakeholders' consultation on the RAINS model projections (see article page no.1)

September 23-24
Conference on the New European Chemicals Policy within the enlarged Union – Austria

October 10-22
OSHA European Weeks for Safety and Health at Work 2004

November 1
New European Commission assumes office

November 15-16
Fifth ESIG Solvents Stewardship Awards

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