

Voluntary commitment of the PVC industry

Progress report 2001



I Forward

The signature of our Voluntary Commitment in March last year broke new ground for the industry by setting out a partnership approach involving each part of the PVC supply chain to deliver commitments that cover the whole PVC lifecycle.

The Voluntary Commitment is the PVC industry's response to the challenge of sustainable development in the first decade of the new millennium and it will drive us towards achieving four key objectives:

- Continuous environmental improvement and resource efficiency during manufacture
- Sustainable use of additives within PVC applications



The Voluntary Commitment is the PVC industry's response to the challenge of sustainable development in the first decade of the new millennium

- Responsible management of PVC products at the end of their useful life
- Managing delivery of these projects and provision of appropriate financial resources

Over the last year we have been building on the words with actions securing the financial resources required and implementing practical projects focused on enabling us to reach agreed targets against clear deadlines.

This first annual progress report demonstrates our commitment to open and transparent reporting and sets the scene for our work over the next 10 years. It provides information on how we have been working to further reduce the environmental impact of PVC manufacture and expand options for sustainable PVC waste management around Europe. It also describes the research and feasibility studies we are

undertaking to help us achieve our longer-term goals.

As the essential elements of our commitment are verifiable and quantifiable targets, we are committed to independent verification and evaluation of our progress. We are therefore looking forward to the completion of the European Commission's work to establish guidelines for voluntary initiatives by industry. We will use these guidelines as the basis for independent verification of future progress reports.

We are a united industry. By working together across the product lifecycle, I am confident that we will fulfil our commitment to continuous improvement. Once you have read this report, I hope that you will provide us with your feedback, via our web site www.pvcinitiative.com so that we can work with you to build a sustainable future for PVC.

A stylized, handwritten signature in black ink, appearing to read 'JPleska'.

Jean-Pierre Pleska
Chairman of the Voluntary Commitment Management Committee

2 Contents

- 1 Forward**
- 2 Contents**
- 3 Mapping out a sustainable future**
- 4 The Horizontal Initiative**
- 5 Progress on Commitments**
 - Engaging stakeholders
 - Towards a better understanding
 - PVC Manufacture
 - Additives
 - Waste Management
 - Management and Financial Scheme
- 6 Key Milestones for 2001**
- 7 Glossary of Terms and Abbreviations**
- 8 The European PVC Industry Associations**



3 Mapping out a sustainable future

Polyvinyl Chloride (PVC) is one of the major thermoplastic materials. Its uniquely versatile performance delivers substantial benefits, making it the material of choice in many applications and sectors in our modern society: construction, transportation, electronics and health.

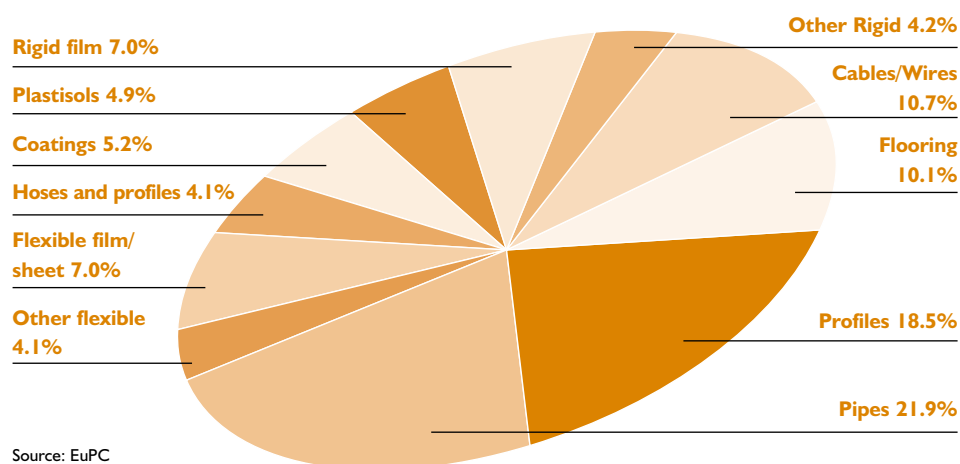
The material has been subject to much debate and scrutiny over recent decades covering many aspects of its lifecycle.

Numerous independent studies have broadly concluded that PVC is an eco-efficient material which, when

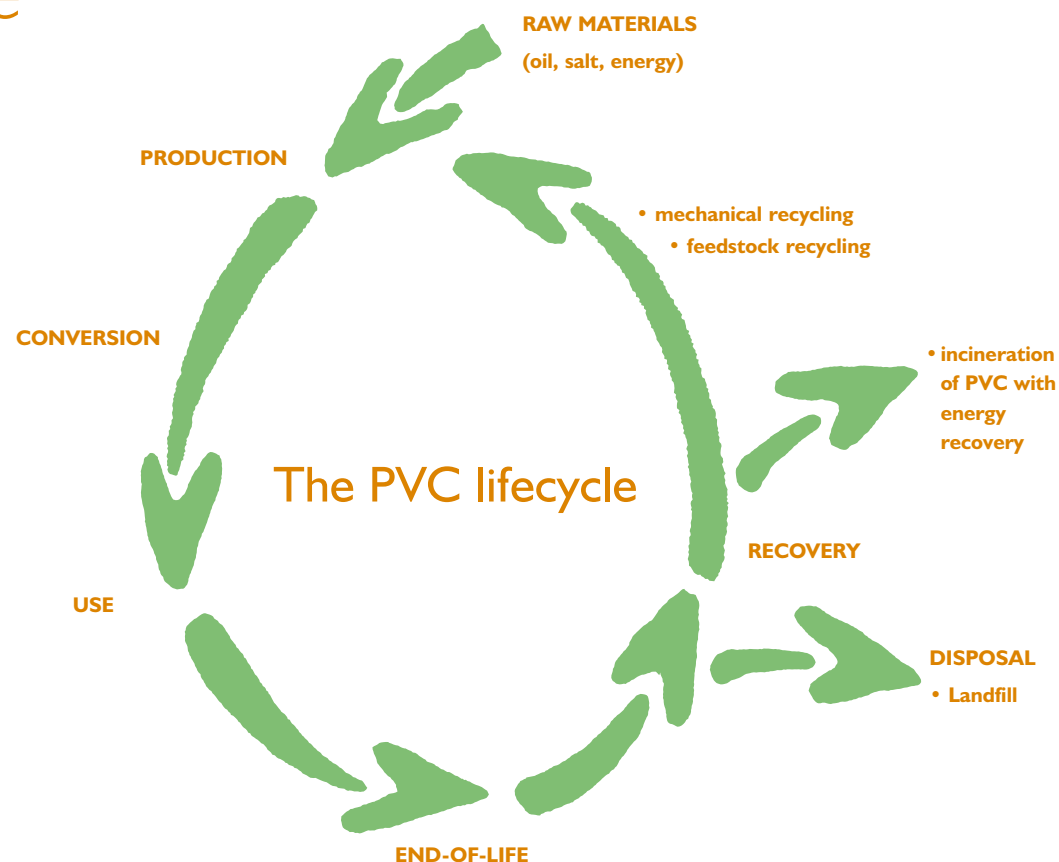
responsibly managed from cradle to grave, provides sustainable benefits to society. This report describes the actions that have been undertaken during the past year by PVC producers and their industry partners to enhance responsible product management.

The PVC industry adds value to society. Industries directly linked to PVC production – such as resin producers, converters and manufacturers of finished products involve over 530,000 people throughout Europe.

End use applications for PVC in Western Europe, 1999



Source: EuPC



Today, worldwide demand for PVC resin exceeds 25 million tonnes annually. The European market reached approximately 5.5 million tonnes of PVC resin in 2000, corresponding to 8.3 million tonnes of finished product. The value of finished PVC products is estimated at 75 billion euro.

The industry as a whole comprises of PVC resin manufacturers, additive

producers and converters. Represented by their European Associations, ECVI, EuPC, ESPA and ECPI (see Section 7), the industry united voluntarily in March 2000 with the signature of its Voluntary Commitment. This sets out an integrated approach to deliver responsible cradle to grave management.

4 The Horizontal Initiative

PVC is the first material to have been subject to a 'horizontal initiative' within Europe. This initiative was prompted by questions raised about the role of PVC within the management of various products at the end of their useful life.

"Rather than examine this role within each separate waste stream, the European Commission decided to undertake the horizontal initiative to develop a PVC policy that could be applied across all PVC waste streams," explains Jean-Pierre De Grève, Executive Director of ECVI and general co-ordinator of the industry's voluntary approach.

"This is seen as a pioneering approach that will set a standard for the future. The process has been tackled in an innovative way, with co-responsibility between DG Enterprise and DG Environment leading to joint decisions on EC policy development.

"During the initial stage, five independent studies on different aspects of PVC waste management were commissioned. Based on the results of these studies and other existing information, the Commission

adopted a Green Paper on PVC in July 2000. This raised a number of questions and outlined possible options for implementing a European strategy on PVC.

"Publication of the Green Paper was followed by a period of public consultation, culminating in a public hearing in October 2000 that provided an opportunity for stakeholders to talk together in a transparent and open discussion, keeping the debate on track to deliver sustainable solutions.

"Since the public hearing, the Commission has been considering views that have been presented and is awaiting recommendations on the Green Paper from the member states and European Parliament. It is understood the Commission is then planning to issue a Communication defining the EU policy on PVC by mid-2001."

The role of the PVC industry

"The PVC industry provided comments on all of the horizontal initiative studies to the Commission and presented clear, practical answers to the various questions raised in the Green Paper," says Jean-Pierre.



Jean-Pierre De Grève
Executive Director
ECVI

"We feel there are limitations in examining one material in isolation. The ultimate goal should be to achieve sustainability, not only for waste management, but across the whole PVC product lifecycle and against comparative analysis with alternative materials.

"The PVC industry believes voluntary action is the only workable approach when a single material is concerned."

5 Progress on commitments

A. Engaging stakeholders

Through the Voluntary Commitment, the European PVC industry has been discussing with all parties the best ways to achieve improved stewardship for their products. At the European Commission public hearing in October, they offered an open invitation for all stakeholders to join them in working towards a successful outcome.

Martyn Griffiths, ECVM Communications Manager, explains how the industry has been working. "PVC producers and their industry partners have been contacting stakeholders across Europe over recent years to understand their views and establish a dialogue," he says. "At European level the work has been undertaken by the four PVC industry associations and within each country a collection of national organisations, known as the PVC Network, has been involved in various forms of stakeholder contact."



During the past year, communication activities have included:

- **Participation** The PVC industry's response to the Green Paper and participation in the public hearing was co-ordinated by the four industry associations ECVM, EuPC, ESPA and ECPI. A new web site, www.pvcinitiative.com, was set-up to give public access to all of the information submitted to the European Commission and provide a means for stakeholder feedback.
- **Discussion forums** The Italian Centro di Informazione sul PVC organised a discussion forum entitled 'Cling Films: the positive choice for the consumer', attended by more than 100 delegates, including 40 journalists.
- **Seminars** The Iberian Forum hosted a seminar with the Spanish Socialist Trade Union UGT on 'The Green Paper, Analysis, Debate and Voluntary Commitment of the PVC Industry.'



Martyn Griffiths
Communications Manager
ECVM



European unions and employers launch dialogue

European PVC industry unions and employers have set up a forum for dialogue on "vital issues" surrounding the sector's future and their potential social effects on employees.

The dialogue agreement between the European Mine, Chemical and Energy Workers' Federation (EMCEF) and three employer associations (ECVM, ECPI and ESPA) was announced in Brussels at the end of October 2000.

The dialogue will cover:

- Industry development of European health, safety and environmental standards
- Training and further training
- Standards transfer to "accession countries"
- European works councils

The full text of the agreement is available from www.pvcinitiative.com.

- **Conferences** The Danish PVC Information Council undertook a joint conference, together with the Confederation of Danish Industries and Danish Plastic Federation, for important stakeholders in the PVC debate.

- **Face-to-face meetings** The PVC Steering Committee in the Netherlands undertook a series of meetings with the Dutch Consumer's League to understand their views and discuss issues that were important to them.

- **Information campaigns** Arbeitsgemeinschaft PVC und Umwelt eV (AgPU) continued their PVCplus campaign in Germany demonstrating the benefits of PVC to decision-makers in industry and the construction sector, as well as the general public.

- **Voluntary agreements** Following extensive dialogue with major retailers, the UK PVC industry has agreed a Voluntary Charter that focuses on the production of PVC for packaging applications. It has also undergone an analysis against the Natural Step Sustainability System Criteria, the results of which have been made publicly available.

Building social dialogue

The PVC industry recognises that an important element in building a long term strategy towards sustainability is understanding and enhancing its role within society. With this in mind, it has begun to seek out opportunities for social dialogue with trade unions and other important organisations.

Harmonising standards across Europe

“ECVM and EMCEF will be hosting a seminar in Warsaw on 19th and 20th of September, 2001 for industry managers and HS&E experts in all countries that have applied to join the European Union,” explains Arjen Sevenster, Technical and Environmental Affairs Manager with ECVM.

“The seminar will focus on environment, safety and health issues related to the manufacture of PVC,” says Arjen. “The objective is to share experience about HS&E regulations and industry’s efforts to comply throughout Europe.”

More specifically, the topics to be covered are:

- European Union health, safety and environment regulations, expected developments and requirements for countries applying to join
- Voluntary commitments by the Western European industry (e.g. charters) and activities needed to achieve their environmental objectives
- Best practice in environmental management
- Regulations relating to production and transportation
- Safety management systems and essential elements of technical safety
- How the Western European industry has responded to health issues relating to VCM
- Results of recent studies on exposure to VCM and PVC dust
- How to enhance co-operation between Eastern and Western European companies

B. Towards a better understanding

“Contributions to the discussion at the PVC public hearing in October 2000 provided evidence that there is still confusion over the role that PVC plays in a number of environmental and health issues,” believes Jean-Pierre Pleska, Chairman of the Voluntary Commitment Management Committee. “We will continue to provide objective data as a means to helping stakeholders make an informed choice on the issues that matter to them.

“One of the ways we are seeking to fulfil this commitment is by commissioning and publishing new research undertaken by independent organisations,” says Jean-Pierre. “Research has been recently undertaken on a number of subjects.”

- Long-term behaviour of PVC products under soil-buried and landfill conditions (Mersiowsky et al., July 1999)
- Behaviour of PVC products in landfilled municipal solid waste (MSW) at different temperatures (Ejertsson et al., September 2000)

- Incineration of PVC and other products in MSW. Assessment of additional costs for various wastes with comparison to PVC in domestic waste incineration (Bertin Technologies, November 2000)
- Feasibility study of the salt mines storage route. Step 1 Report – Appraisal of the salt mines storage route for residues from incineration (Bertin Technologies, February 2000)
- Feasibility study of the salt mines storage route. Step 2 Report – Comparison of the salt mines storage with competing routes for incineration residue management (Bertin Technologies, March 2000)
- MSW incinerations salt residues: Survey of technologies for treatment (TNO Environment, August 2000)
- PVC and MSW incineration: Burden or benefit (TNO Environment, December 1999)

Full references for these studies and details of how to obtain copies can be found at the www.pvcinitiative.com web site.

C. PVC Manufacture

COMMITMENT PVC manufacturers commit to ensuring that each VCM and Suspension PVC plant in Europe fully complies with the 1995 ECVM Charter. Reports assuring full compliance will be available in June 2000 and the potential for further plant optimisations will be investigated in 2001.

In June 1999, the results of an independent audit of ECVM member company sites against the Industry Charter for the production of VCM and PVC were published. These revealed that the member companies had achieved 88% compliance against the standards set in 1995.

Companies whose plants did not fully comply with the Charter standards at the time have been working on internal plans to fit with their individual business development programmes. Progress up until the end of 2000 has raised the level of compliance to 96%. All member company sites do fully comply with national legislation. The standards included in the Charter are often higher than those required by national legislation, requiring significant upgrades to plants.

There are still a small number that fall short of the high standards required to be

met. It is expected that the few remaining shortcomings will be fully resolved before the end of 2001. Follow-up independent verification of compliance across all member company sites will then be undertaken and the results made publicly available.

The technology for making PVC via the emulsion process is different to the suspension process. Member companies are currently undertaking the necessary upgrades to meet the standards set in the ECVM charter in line with their 2003 deadline.

COMMITMENT PVC manufacturers commit to comply with the Emulsion PVC Charter signed in February 1999. The Charter's deadline for compliance is the end of 2003 and compliance will be externally audited and published by mid 2004.



COMMITMENT PVC resin, plasticiser and stabiliser manufacturers commit as individual companies to:

- Continue to improve their resource consumption (material and energy use) during manufacture;
- Set ongoing targets to reduce resource consumption where economically and ecologically this is warranted;
- Review their progress towards such targets on an annual basis.



Lifecycle Assessments (LCA) are powerful tools to assess raw materials consumption and environmental impact of manufacturing activities over the complete production chain, starting with primary energy and raw material sources.

The Association of Plastics Manufacturers in Europe (APME) has been using this tool to collect relevant and comparable data for all major plastics. PVC is an integral part of this effort. Data have been collected in 2000 in order to update the PVC LCA, due for publication in 2001.

Assessment of resource consumption during manufacture is the first and necessary step on the way to improvement. Thereafter, the industry will move to setting targets and reporting systems. The targets require not only full support of the industry, but also consistency with initiatives for reduction of CO₂ emissions throughout the EU.

Arjen Sevenster

Technical and Environmental Affairs Manager
ECVM

PROJECT UPDATE

ECO-EFFICIENCY

Steering sustainable strategy

“A ‘PVC and Sustainable Development’ Task Force was created by the industry in September 2000. Its purpose is to define what sustainable development means for the PVC industry, assembling relevant information from internal as well as external sources and proposing steps for progress,” says Arjen Sevenster, ECVN Technical and Environmental Affairs Manager.

Key areas that have been identified for attention are:

- Production of PVC from alternative resources (more abundant or renewable)
- Further decreasing the amount of manufacturing energy that is drawn from non-renewable resources
- Deepening knowledge about the eco-efficiency of PVC and ways to enhance it further.

“The Voluntary Commitment is a significant step along the path towards sustainable development,” believes Arjen. “Creation of the Task Force demonstrates that the industry is not prepared to rest here and is looking far into the future with its plans for continuous improvement.”

Taking the Natural Step

During 2000, the UK PVC industry published the results of an ambitious research project that identified challenges faced by the whole industry in its efforts to make the material truly sustainable.

The UK PVC Co-ordination Group was set up in 1997 comprising representatives from a number of major retailers, PVC manufacturers (Norsk Hydro & EVC International) and the UK Environment Agency.

One of the group's most important initiatives has been a research project with The Natural Step (TNS) to evaluate the PVC lifecycle. A report containing details of the research and consensus-building work that went on around it was published at the beginning of August 2000.

"Representatives of the UK PVC industry recognise the magnitude of these challenges, but accept that they provide a helpful agenda for action," says Jonathon Porritt, leading UK environmentalist and chairman of the UK PVC Co-ordination Group.

Porritt believes it serves little purpose arguing for the elimination of PVC without first assessing the degree to which any substitute would have a lower 'sustainability footprint'. "PVC may or may not have a place in a genuinely sustainable society, but exactly the same questions must be asked of all materials, be they man-made or natural, before leaping to what are often ill-judged and unscientific conclusions," he says.

"The objectives of the European PVC Industry and its Voluntary Commitment are in line with the TNS investigations," says Jean-Pierre De Grève, ECVI Executive Director. "Implementation of our Voluntary Commitment has set us on our way to meeting the challenges outlined by this report."

D. Additives

Plasticisers

COMMITMENT The plasticisers industry will continue to conduct research in order to provide scientific studies and expertise to help policy-makers develop well informed decisions at the earliest possible time.

Over the past year, the plasticiser industry has spent 1.4 million euro on research and will spend another 1 million euro in 2001.

During 2000, a number of studies have been finalised, including one conducted to facilitate the EU risk assessment of di-butyl phthalate (DBP) which demonstrated that inhalation by rats of extremely high levels of DBP had no adverse effects. A more fundamental study clarifying the mechanisms by which phthalates and similar substances produce different effects in different species was completed and published in the peer-reviewed literature.

The effect of phthalates in sediments on the hatching of frog eggs and subsequent tadpole development was investigated using a methodology agreed by the EU competent authorities. The study concluded that there were no adverse effects even at phthalate levels many times higher than those found in the environment.

COMMITMENT The industry sector will continue to improve the already sizeable scientific database of its products consistent with Responsible Care® principles and use it to propose improvements based on the results of EU risk assessments.

EU risk assessments are currently being undertaken on Dibutyl phthalate (DBP), Di-2-ethylhexyl phthalate (DEHP), Diisononyl phthalate (DINP), Diisodecyl phthalate (DIDP), and Butylbenzyl phthalate (BBP). These are due to be completed during 2001. Proposals for improvements will be made once the results are known. In the meantime, the industry is already embarking on a major

research study on fish to specifically address an outstanding data gap that is known to exist.

COMMITMENT Industry supports the concept of Lifecycle Analysis (LCA) evaluation of materials in order to highlight possible improvements. It will work towards completion of a database on various plasticisers for PVC to achieve this goal. It is anticipated that this will be completed by the end of 2000.

ECPI completed a major project to calculate the eco-profile of high-volume phthalate esters at the end of last year. The calculations, which will allow users to carry out life-cycle assessments of their own products, will be published during the first half of 2001. The eco-profile will also allow the industry to identify possible ways of improving manufacturing of high volume phthalates.

Stabilisers

COMMITMENT The use of cadmium in all stabiliser systems placed on the European market will be phased out within one year, taking into account the technical feasibility in line with Council Resolution of 25 January 1988 (88/C30/01).

No members of ESPA will sell such products in the European Union, Norway and Switzerland, and that EuPC will communicate to its members not to use cadmium based stabilisers.

The stabiliser industry devotes a lot of resources to developing newer stabiliser systems. Liquid stabiliser systems used to be based entirely on barium/cadmium (Ba/Cd) systems. They are now based on barium/zinc (Ba/Zn) or calcium/zinc (Ca/Zn) systems. Cadmium based systems have been reduced to 230 tonnes in 1998, from a total that exceeded 16,000 tonnes 15 years ago.

COMMITMENT Currently there is no unacceptable risk identified in the use of cadmium stearate and laurate which would preclude the continued recycling of these products. ESPA members will continue to work with the Commission on targeted risk assessment for such products.

In December 2000 ESPA sent a letter to the customers of its members confirming that no ESPA members will sell such products after March 2001.

In the spirit of the Voluntary Commitment, the four PVC industry associations will work together towards the use of alternatives to cadmium based stabilisers.

The EU targeted risk assessment on cadmium based stabilisers is ongoing and a report will be issued by the CSTEE in March 2001. ESPA is awaiting the publication of this report in the near future.

The ESPA members producing lead stabilisers are now registered as a consortium under the CEFIC and ICCA

COMMITMENT ESPA members will continue to research and develop alternative stabilisers to the widely used and highly effective lead-based systems.

COMMITMENT ESPA will produce yearly statistics showing which stabilisers are purchased by the converters. It will also produce statistics showing which stabilisers are being used in window and profile production, pipe and cable applications.

programmes. Targeted risk assessments on the 9 lead compounds used in the lead stabilisers are underway. The methodology used will be the same as that for the EU cadmium compounds targeted risk assessments and approved by the CSTEE.

In 1999, ESPA members spent approximately 5 million euro on research into lead stabilisers. In December 2000, ESPA sent a letter to the customers of its members in order to encourage lead substitution.

Tonnes of stabiliser systems	1997	1998	1999
Formulated Lead Stabiliser ¹	111,920	112,383	117,995
Formulated Solid Stabilisers – containing cadmium ²	1,401 71 tonnes Cd	940 33 tonnes Cd	259 21 tonnes Cd
Formulated Mixed Metal Solid Stabilisers eg. Ca/Zn systems ³	Statistics not collected	14,494	16,701
Tin Stabilisers ⁴	14,886	15,241	16,342
Liquid Stabilisers – Ba/Zn or Ca/Zn ⁵	16,168	16,404	16,527
Liquid Stabilisers – containing Cadmium ⁶	368 33 tonnes Cd	230 17 tonnes Cd	148 10 tonnes Cd

Note: Formulated means that these systems are complete stabiliser/lubricant packages and also may include pigments, fillers as a service to the customer.

¹ Used in pipe and profiles for construction and in electrical cables.

² Used only in construction profiles

³ Includes food-contact and medical applications plus all the lead replacement systems

⁴ Used primarily in rigid applications including food-contact use

⁵ Used in the wide range flexible PVC application, calendered sheet, flooring etc.

⁶ Used in flexible and rigid applications. This used to be the primary stabiliser system for flexible applications but has decreased to very low use levels.

Tonnes of stabiliser systems	Pipes	Cables	Profiles
<i>1998</i>			
Formulated Solid Cadmium Stabilisers	0	0	940
Formulated Lead Stabilisers	35,902	20,418	54,427
Formulated Mixed Metal Solid Stabilisers	903	6,820	5,630
Tin Stabilisers	160	0	109
<i>1999</i>			
Formulated Solid Cadmium Stabilisers	0	0	202
Formulated Lead Stabilisers	37,630	20,235	58,721
Formulated Mixed Metal Solid Stabilisers	1,426	6,276	8,470
Tin Stabilisers	302	0	247

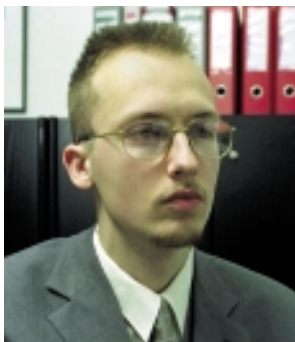
ESPA has published statistics for the three main uses of lead in 1997, 1998 & 1999 (see table left). Figures for 2000 will be published shortly. This information gives a clear picture by application.

It is important to understand that these tonnage figures shown in these tables represent sales to EU Countries, plus Norway and Switzerland. Some of the PVC products made with these stabilisers are exported, but stabilisers included in imported PVC products (very limited volumes) are not included.

There is currently pressure on lead stabiliser systems, which are used in particular for drinking water pipes, where such uses of lead have wide regulatory approval, based on a proper risk assessment.

Brigitte Dero
Secretary General
ESPA





Geoffroy Tillieux
Issues Manager
EuPC

E. Waste Management

The Voluntary Commitment Management Committee has committed to funding all the projects detailed within the project update sections of this report.

COMMITMENT The PVC industry will examine how recycling schemes already operating in some European countries (e.g. German scheme for PVC window frames as well as several schemes for pipes) could be expanded for use in other EU countries.

An inventory of existing PVC recycling schemes has been compiled for various application sectors, including pipes, window frames, flooring, roofing, cables, insulation membranes and coated fabrics.

COMMITMENT By the end of 2002 the industry will have identified the generation and sources of processing and installation waste to set meaningful improvement targets.

EuPC is currently investigating the generation and sources of processing waste through its sectoral associations, with the aim of identifying ways for further increasing the already high recycling rate for this kind of waste.

COMMITMENT The plastics pipe and fitting producers represented by TEPPFA, commit to mechanically recycle increasing quantities of PVC pipes and fittings at their end-of-life. The commitment is to recycle at least 50% of the collected available quantity of pipe and fittings waste by 2005.

Progress against this target will be reported annually to the European Commission, and published from 2002 onwards.

PROJECT UPDATE MECHANICAL RECYCLING

Mechanical recycling of waste from plastic pipes

Funding in 2001: 8 million euro

Timescale: 2000 - 2005

During 2000, The European Plastics Pipe and Fitting Association (TEPPFA) undertook the following actions:

- Established a plan for mobilising its members and National Associations.
- Produced an inventory of the existing collection/recycling schemes in Sweden, Denmark, Netherlands, Germany and Austria to help improve existing systems or set up new ones in all EU member states.
- Set-up collection and recycling task-forces in all countries of the TEPPFA National Association countries.

“Pipe waste made from other plastics is to be collected alongside that made from PVC and recycled to provide customers with a beneficial service that sets plastic pipe systems apart from those made from other materials,” says Roel van’t Veer of TEPPFA.

For 2001 TEPPFA will concentrate on 3 priority countries: Germany, France and Spain. “For each of these countries, pipe collection and recycling scheme development plans will be compiled,” explains Roel. “These will consist of organisational requirements, an investment review and a business plan covering the period up to and including 2005. Outside of the priority countries, work will continue to establish actual waste volumes and develop collection/recovery schemes in co-operation with third parties.”



Roel van't Veer
Projects Co-ordinator
TEPPFA

COMMITMENT The window frame sector, represented by EuPC, commits to mechanically recycle increasing quantities of PVC window frames at the end of life of this application. The commitment is to recycle at least 50% of the collectable available quantity of window profile waste by 2005.

Progress against this target will be reported annually to the European Commission, and published from 2002 onwards.

COMMITMENT For other potential applications such as PVC cables, flooring and roofing membranes, more work is needed in developing suitable logistics, technologies and reuse applications. The PVC industry is committed to supporting these developments in order to achieve higher mechanical recycling targets as soon as possible.

Whilst the existing capacity for recycling pipes, roofing and window frames requires further expansion, there is potential of significantly increasing the capacity for other application recycling schemes.

PROJECT UPDATE MECHANICAL RECYCLING

Mechanical recycling of post consumer PVC windows

Funding in 2001: 1.04 million euro

Timescale: 2000 - 2004

“The European PVC Window Profiles and related building Products Association (EPPA) was founded as a sector group of EuPC in March 2000” explains Ludo Debever, Executive Secretary, EPPA. “It has been responsible for creating a working group examining the recycling of PVC window frames, involving experts from the European PVC window industry.”



Ludo Debever
Executive Secretary
EPPA

To meet the PVC industry's commitment in respect of window frame recycling, EPPA has embarked on a project with three key phases:

- Phase 1: Research realistic figures on end-of-life PVC window frame volumes. This phase has been completed.
- Phase 2 (January – June 2001): Research the most effective methods to increase post-consumer window frame collection, carried out by independent consultants TNO. Also examine existing national initiatives, cost calculation, European management structure for co-ordination of recycling schemes and best practice.
- Phase 2b (July – December 2001): Develop a business and communication plan. Begin implementation of collection and recycling scheme.
- Phase 3 (2002-2004): Further expansion of schemes in function of research recommendation & commitment targets.”



Solvay Ferrara Project – development of Vinyloop® Technology

Investment: 10 million euro

Timescale: 2001 - 2002

Capacity: 10,000 tonnes per annum

The Ferrara project is a joint venture between Solvin, Solvay and partners in the cable processing and recycling businesses. It will be the first opportunity to test the Vinyloop® composite recycling technology on an industrial scale.

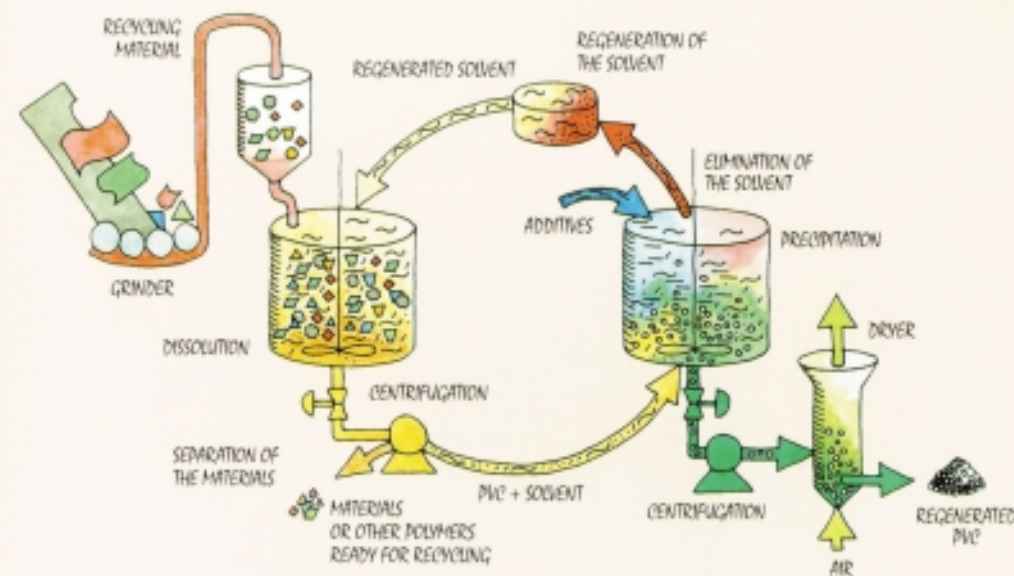
Vinyloop® is a solvent based technology, where PVC is first dissolved and then selectively filtered and precipitated. It is best suited for composite material (containing PVC and other substances). The compound obtained is of very high quality and closed-loop recycling back into the same application is possible for most of the material treated.

Patrick Crucifix, President of Vinyloop Ferrara SpA and Vinyloop® Project Leader, explains: “The scale-up from the 70 kg of PVC compounds, in the pilot plant, to 25,000 kg per day at the Ferrara plant is a real challenge. Our goal is to guarantee the quality of the re-generated PVC compound, and we intend to get the ISO certification in a very short period of time after the start-up.

“Construction at Ferrara in Italy started in March 2001 and we should be able to recycle our first batch in November 2001,” believes Patrick. “10,000 tonnes of PVC post-consumer waste per year will be re-generated.

“This first industrial application will help us consolidate the Vinyloop® process and improve its efficiency, we can increase capacity throughout Europe for other composite PVC applications. In the difficult area of PVC composite wastes, the Vinyloop® process will help the PVC industry to meet the targets of the Voluntary Commitment”

The Vinyloop® Process



Ferrari Project – development of Vinyloop Technology

Scheduled investment: 18 million euro

Timescale: 2002 – 2006

Capacity: 10,000 tonnes per annum

Ferrari, a medium-sized French company which specialises in manufacturing products from PVC coated fabric (e.g. tarpaulins, tents, tensile roofing, advertising panels), initiated a research project with its PVC resin supplier (Solvin) to find the best solution for recycling coated fabrics.

“Finding a solution to the end-of-life management of our products will help us grow the market for our products,” says Romain Ferrari.

“Whilst using the same core technology as the Solvay Ferrara, our project has its own special requirements. In particular, the recycling of a product with such a high fibre content, as used by Ferrari to manufacture their products, necessitates additional research into the Vinyloop® technology and marketing of this recovered product.”

“The project will involve the construction of a recycling plant with a capacity of up to 10,000 tonnes per annum, scheduled to begin operating by the end of 2003. Complimentary studies on the treatment fibres will be undertaken in 2001. The results will be relevant for the whole coated fabrics sector.”

EPFloor Project

Funding in 2001: 0.45 million euro

Timescale: 2001

The European PVC Flooring group (EPFloor) is an EuPC sector group.

“Recycling of PVC flooring is not new,” explains Simon Kroon of EPFloor.

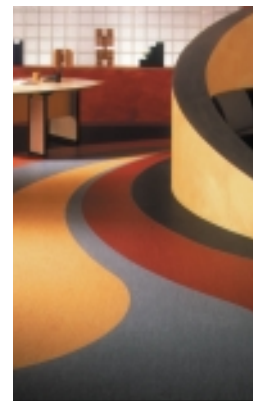
“Most flooring scrap is currently recovered internally by the industry.

However, mechanical recycling of post consumer flooring in Europe is currently limited (ca. 1,500 tonnes in 1999) due to quality issues with the waste generated.”

“To tackle this problem, the PVC flooring industry has united within EPFloor to investigate new methods of collection and recycling. We are currently assessing Vinyloop® and feedstock recycling as technology options, as well as investigating collection methods and the market potential for recyclate.”

Key EPFloor milestones for 2001 will be:

- Testing of recyclate within flooring producing companies to be concluded by the end of April;
- Preliminary business plan for setting-up recycling capacity and final decision on technology in June;
- Presentation of ‘business concept’ and request for funding from the Voluntary Commitment Management Committee in October.



COMMITMENT The PVC industry commits to develop the use of high-quality mechanically recycled PVC in new products. It is important to bear in mind that the PVC industry has already developed a systematic take back scheme for production waste and will develop similar schemes for installation and transformation waste.

Whenever mechanical recycling is the most sustainable waste management option, PVC converters are working to develop the appropriate collection and recovery systems, as described for pipes and window frames above.

The use of recycled PVC in new products will be promoted through the development of product standards. A complete plastics recycling standardisation programme has been presented to CEN and EU Commission by EuPC and APME.



Construction of the Tavaux pilot plant was completed on time and the rigorous process of a full plant commissioning has begun.

Rolf Buhl

Chairman, ECVM feedstock recycling steering group

COMMITMENT PVC producers commit to invest 3 million euro by 2001 in a pilot plant, with the objective to recover the chlorine and hydrocarbons. Depending on the outcome (expected for middle of 2002) a decision on the building of a commercial scale plant will be made.

PROJECT UPDATE

FEEDSTOCK RECYCLING

Tavaux Pilot Plant – development of feedstock recycling

Investment committed: 3.3 million euro

Timescale: 1999 – 2002

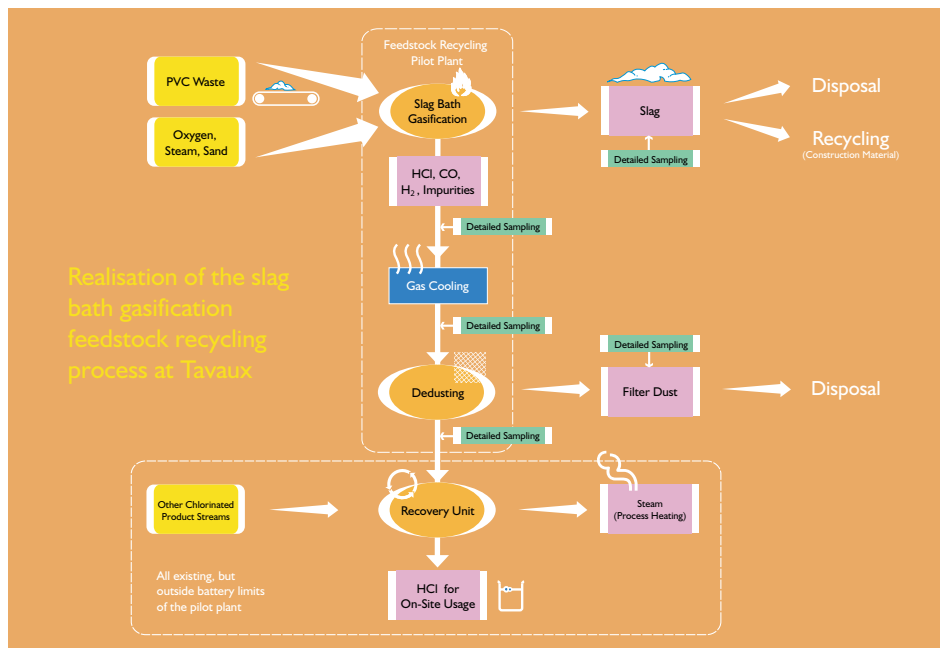
Capacity: 2,000 tonnes per annum

Construction of the Tavaux pilot plant was completed on time and the rigorous process of a full plant commissioning has begun. ECVM and its project partners are investing 3.3 million euro in the project to establish a proven feedstock recycling process for exploitation on a commercial scale.

European PVC producers took the initiative back in 1995 to investigate potential feedstock recycling technologies and made the commitment in 1999 to build a pilot plant with a capacity of 2,000 tons per annum at Tavaux in France. The plant employs a slag bath gasification process to recover hydrochloric acid and syngas for use by PVC producers.

“The purpose of the trial is to demonstrate that complex materials, including laminates and co-extrusions, can be handled effectively,” explains Rolf Bühl, chairman of the feedstock recycling pilot plant steering group. “The first waste stream to be introduced will be PVC cables. We will then move on to coated fabrics, flooring and other wastes to determine the effects of varying chlorine contents and different fillers.

“Throughout the trials we will vary parameters to determine the most efficient method for cracking waste products into their different components, achieving the highest rates of hydrochloric acid and syngas recovery for use in PVC production,” says Rolf. “Initial assessments against the success criteria for this technology are expected later this year and a decision will be taken in 2002 for expanding the plant to a commercial scale.”



COMMITMENT Other potential feedstock recycling processes will be investigated in parallel by the PVC industry. It is assumed, that by the year 2005, feedstock recycling will make a substantial contribution to the treatment of PVC rich plastic waste.



Tavaux feedstock recycling pilot plant

PROJECT UPDATE FEEDSTOCK RECYCLING

DOW/BSL Project – development of feedstock recycling

Funding: 0.25 million euro

Timescale: 2001

Capacity: Potentially 15,000 tonnes per annum when fully developed

In addition to constructing their own feedstock recycling pilot plant at Tavaux, under the Voluntary Commitment financial support is also being provided for the development of feedstock recycling trials of mixed rigid and flexible PVC waste at an existing plant in Schkopau, Germany, operated by DOW/BSL.

“This plant operates a rotary kiln incineration process, designed to recover hydrochloric acid and energy,” explains Rolf Bühl, chairman of the feedstock recycling steering group.

“During 2001 a 1,000 tonne trial will be conducted using various PVC waste products from a number of sources. If this trial is successful, there is the potential for expanding at Schkopau by contracting to recycle up to 15,000 tonnes per annum. The output will be purified hydrochloric acid for use in chlorine and PVC production.”

PROJECT UPDATE FEEDSTOCK RECYCLING

Stigsnaes Project – development of feedstock recycling

Funding: 0.26 million euro

Timescale: 2001 - 2002

Capacity: Potentially 50,000 tonnes per annum when fully developed

A further feedstock recycling development project is receiving financial support under the Voluntary Commitment at an existing 50,000 tonne hydrolysis plant at Stigsnaes in Denmark. This project also has the support of the Danish Environmental Protection Agency.

Here, mixed rigid and flexible PVC waste is recycled in a two step process. The first step is thermal hydrolysis, yielding an aqueous sodium chloride (salt) solution, which when purified is discharged into the nearby Baltic Sea. In the second step the remaining fraction is treated in a gradual pyrolysis process to recover the hydrocarbons, fillers and heavy metals for reuse in the industry.

Testing of the existing hydrolysis plant with PVC waste products will commence in the second quarter of 2001. If the results are positive, pyrolysis equipment will be built and tested before the end of 2002. At the end of the trial, a decision will be taken, towards the end of 2002, whether or not to modify the existing plant to make use of its full capacity.

REDOP Project – dehydrochlorination of mixed plastic from MSW*Funding:* 0.03 million euro*Timescale:* 2001 - 2002*Capacity:* To be confirmed

This is a project, based in the Netherlands, designed to develop a process for using mixed plastics with limited (specified) chlorine content as a reducing agent in blast furnaces. A consortium of organisations, including the steel producer Corus, the Association of Plastics Manufacturers in Europe, European PVC Producers and their partners is supporting this project.

The process begins with dehydrochlorination and granulation of the waste. The granules are then injected into a steel-making blast furnace, as a substitute for coke. A pilot plant will be built and trialed during 2001. Following a positive outcome to the trial in 2002 the process will open the potential for treating large quantities of mixed plastics, including PVC.

COMMITMENT The PVC industry commits to support technology developments in order to minimise the quantities of salt residues produced and develop purification technologies, with the objective to recover the salt to be reused in chemical processes, and minimise the final residues to be disposed.

The PVC industry has created an expert task force to study issues around salt residues and find the most promising methods and technology for further development. The PVC industry has set up a pilot plant at Rosignano in Italy to recycle, as a raw material, the residual salts of gas treatment coming from incineration. After a positive trial period, there is now an industrial scale plant under construction in France.

F. Management and Financial Scheme

Eight new projects contributing to the Voluntary Commitment objectives have been selected and launched in 2000 in addition to the Tavaux pilot plant.

- TEPPFA Project (pan European)
- EPPA Project (Pan European)
- Solvay Ferrara Project (Italy)
- Ferrari Project (France)
- EPFloor Project (Pan European)
- BSL Project (Germany)
- Stigsnaes Project (Denmark)
- REDOP Project (Netherlands)

Actual funding of some of these projects started in 2000. For 2000 the Presidents of ECVI, ESPA, ECPI and EuPC have approved financial contributions adding up to 12 million euro in 2001.

The Voluntary Commitment Management Committee (VCMC) was created in May 2000 and met six times during 2000. It has been instrumental in selecting the projects and providing early funding and guidance. It has also

COMMITMENT Sufficient investment is important to underpin the PVC industry's commitments. For this reason, the PVC industry will provide a meaningful level of resources to support the Voluntary Commitment.

COMMITMENT A Management Committee will be created to manage the process described in the Voluntary Commitment.

developed a common view regarding the most suitable structural and legal framework to ensure efficient management of all activities related to the Voluntary Commitment.



The Voluntary Commitment Management Committee

6 Key Milestones for 2001

This is expected to lead to statutory agreements being signed in 2001 and the foundation of a legal entity that will manage the Voluntary Commitment funds to make sure the PVC industry reaches the targets that have been set.

COMMITMENT A rolling three-year framework programme will be proposed by the Management Committee, and approved by the individual associations, describing the projects selected in order to meet the industry commitments as set out in section 2 of the Voluntary Commitment (with the exclusion of the existing feedstock recycling pilot plant).

The VCMC has mapped out the expected progress and funding needs of the projects over the period 2001 – 2003. All parties acknowledge the need for continuity in project support and funding over periods extending beyond one year. Provisions to ensure such continuity will be included in the statutory agreements currently under development.

Quarter 2

- ESPA members stop selling cadmium based stabiliser systems.
- EU targeted risk assessment on cadmium based stabiliser systems due to be issued.
- ESPA publishes 2000 statistics for the three main uses of lead.
- First batches of PVC waste introduced at Tavaux feedstock recycling plant in France.
- Trial starting at DOW/BSL recycling in Schkopau.

Quarter 3

- European Commission issues communication on EU policy for PVC across Europe.
- ECVm and EMCEF seminar in Warsaw for industry managers and HS&E experts in all countries that have applied to join the European Union.
- EU risk Assessments on DBP, DEHP, DINP, DIDP and BBP due for completion.
- EPPA begin implementation of plans for window frame waste collection and recycling across Europe.
- Trial start at hydrolysis plant at Stigsnaes in Denmark.

Quarter 4

- Updated PVC LCA published by the Association of Plastics Manufacturers in Europe.
- First batches of PVC cable waste recycled via Vinyloop® process at Ferrara in Italy.
- ECVm confirms compliance with S-PVC Charter for PVC production at all member company plants.
- Plastic pipe collection and recycling scheme development plans compiled by TEPPFA for Germany, France and Spain.
- Completion of PVC waste feedstock recycling trial at BSL plant in Schkopau, Germany.
- Construction of pilot plant and initial trials completed for REDOP Project in the Netherlands.

The second Voluntary Commitment annual progress report will be published at the end of March, 2002. This report will be externally verified by an independent third party.

7 Glossary of Terms

Definitions for some of the terms used within this report are provided below:

Additives

Materials that are blended with polymers to make them easy to process and give the physical properties required in the end-application. Before PVC can be made into products, it has to be combined with a range of special additives. The essential additives for all PVC materials are heat stabilisers and lubricants; in the case of flexible PVC, plasticisers are also incorporated. Other additives that may be used include fillers, processing aids, impact modifiers and pigments.

Best available techniques (BAT)

BAT is the latest stage in development of activities or methods which indicate the suitability of techniques for preventing or minimising emissions to the environment, without predetermining any specific technology or other techniques.

CSTEE

Scientific Committee for Toxicity, Ecotoxicity and the Environment. The CSTEE is a high level independent

advisory committee of the European Commission on scientific and technical questions relating to the toxicity and ecotoxicity of chemical, biochemical and biological compounds whose use may have harmful consequences for human health and the environment. Its advice is requested by the Commission on new developments that may cause concern for consumer health.

Emulsion PVC

Emulsion PVC (E-PVC) is produced using water, vinyl chloride monomer and an initiator soluble in water. Emulsion PVC applications are mostly plastisols and calendaring, profiles, flooring, wallcoverings, coated fabrics and sealants.

End-of-life

The final stage in a material or product lifecycle. Materials or products at the end of their life can no longer be re-used and must be sent for recycling, energy recovery or disposal.

Feedstock recycling

Feedstock recycling is a form of material recycling, particularly well suited to mixed plastics waste. The technology

breaks plastics down into their chemical constituents. These can be used as building blocks for a wide range of new industrial intermediate and consumer products. In effect, the plastics are reprocessed at the place of origin, the petrochemical complex.

Horizontal initiative

In 1997, as part of the debate on managing end-of-life vehicles, the European Commission embarked on the Horizontal Initiative. The purpose of this review was to gather information on environmental and socio-economic factors associated with the PVC lifecycle, focusing particularly on waste management.

Industry charter

ECVM has two industry charters, one covering production of PVC by the suspension process and the other covering PVC produced by the emulsion process. These charters contain tough environmental standards for production and give commitments of cross-industry co-operation and agreement including research, sharing environmental control expertise and working with stakeholder groups.

Incineration

The burning of material to convert it, at least partly to gases, to reduce its bulk and sometimes recover the energy it contains.

Incineration (with energy recovery) is important as a sustainable waste management option for PVC.

Landfill

Landfills are carefully engineered waste disposal sites. Their aim is to provide a safe and controlled environment into which waste can be deposited and where it is subject to biological breakdown. Engineering solutions are employed to ensure that landfills do not cause pollution in the form of emissions to water and air, or have a negative visual impact on the surrounding landscape.

Lifecycle assessment

Lifecycle assessment (LCA) is a technique for assessing the potential environmental impacts throughout a product's life (i.e. cradle-to-grave) from raw material acquisition through production, use and disposal.

Mechanical recycling

The process by which an end-of-life product is reprocessed into the same or alternative second-life applications. In the case of thermoplastics that reprocessing will be melt processing very similar to that originally used.

Mechanical recycling makes ecological and economic sense whenever sufficient quantities of homogeneous, separated and sorted waste streams can be made available. Products collected for recycling this way include bottles, flooring, pipes, roof coverings and window profiles.

OSPARCOM

The Convention for the Protection of the Marine Environment of the North-East Atlantic was opened for signature at the Ministerial Meeting of the Oslo and Paris Commissions in Paris during 1992. This is concerned with the pollution of the sea by materials originating on land. Most of the countries bordering the North East Atlantic area, the North Sea and the Baltic Sea are represented.

Plasticiser

These are organic compounds, sometimes mixed with polymers to make a more flexible plastic.

The commonest plasticisers are the phthalates, adipates and citrates. By product type, some 35 per cent of PVC is used for plasticised applications.

Polymer

An organic material composed of long-chain molecules made up of many monomer units. Most polymers have a chain backbone of carbon atoms. Polymers are almost always blended with additives before use. Plastics = polymers + additives.

Recycling

The conversion of materials from end-of-life products into second life applications. This second life may be a repeat of the first or something entirely different.

Recyclable

A material or product that is capable of being recovered via mechanical or feedstock recycling is said to be recyclable.

Renewable resource

Resources that can be reproduced by natural processes at a rate that matches or exceeds human consumption, e.g. salt, solar energy. Non-renewable

resources are produced by natural processes, but at a slower rate than human consumption, e.g. oil, coal, natural gas.

Responsible Care®

Responsible Care® is the world-wide chemical industry's commitment to continual improvement in all aspects of health, safety and environment performance and to openness in communication about its activities and achievements. National chemical industry associations are responsible for the detailed implementation of Responsible Care® in their countries.

Stabiliser

A stabiliser is a complex mixture designed to have a preventative and curative action in PVC, during processing and to protect the product during its life, including photodegradation. PVC degrades by dehydrochlorination, autooxidation and mechanochemical chain scission and the stabiliser has to prevent these different mechanisms. It also has to remove polyene sequences which give rise to colour development.

Suspension PVC

Suspension PVC (S-PVC) is produced using water, vinyl chloride and an initiator that is soluble in the monomer. The main applications for this type of PVC are pipes, cables, rigid profiles, building applications and injection moulding.

Sustainable development

The Brundtland Commission described the challenge of sustainable development as "meeting the needs of the present without compromising the ability of future generations to meet their own needs". This encompasses a combination of environmental, social and economic criteria.

VCM

Vinyl Chloride Monomer (VCM) is the monomer building block for the production of the PVC polymer.

Abbreviations

AgPU	Arbeitsgemeinschaft PVC und Umwelt eV	ESPA	The European Stabilisers Producers Association
BBP	butylbenzyl phthalate	EuPC	European Plastics Converters
CEFIC	European Chemical Industry Council	EU	European Union
CEN	European Committee for Standardisation	HS&E	Health, Safety and the Environment
CSTEE	Scientific Committee for Toxicity, Ecotoxicity and the Environment	ICCA	International Council of Chemical Associations
DBP	di-butyl phthalate	ISO	International Standards Organisation
DEHP	di-2-ethylhexyl phthalate	LCA	Lifecycle Assessment
DINP	diisononyl phthalate	MSW	Municipal Solid Waste
DIDP	diisodecyl phthalate	MSWC	MSW Combustion
DG Enterprise	Directorate General Enterprise	MSWI	MSW Incineration
DG Environment	Directorate General Environment	PVC	Polyvinyl chloride
EMCEF	European Mine, Chemical and Energy Workers' Federation	REDOP	REDuction of Ore in blast furnace plants by Plastic Suspension PVC
EPPA	The European PVC Window Profiles and Related Building Products Association	S-PVC	Suspension PVC
E-PVC	Emulsion PVC	TEPPFA	The European Plastic Pipes and Fittings Association
ECPI	The European Council for Plasticisers and Intermediates	TNS	The Natural Step
ECVM	The European Council of Vinyl Manufacturers	UGT	Spanish Socialist Trade Union
		VCM	Vinyl Chloride Monomer
		VCMC	Voluntary Commitment Management Committee

The Voluntary Commitment Management Committee



From the left, **Michael Rosenthal** (President, ESPA), **Joachim Eckstein** (Vice President, EuPC), **Jean-Pierre Pleska** (Chairman of the VCMC & ECVM), **Jean-Pierre De Grève** (Executive Director, ECVM), **Brigitte Dero** (General Secretary, ESPA), **Alexandre Dangis** (Managing Director, EuPC), **Tim Edgar** (Deputy Director, ECPI), **Herman Jansseune** (Chairman, ECPI).

8 The European PVC Industry Associations

If you would like more information on the Voluntary Commitment or any of the issues raised within this document, please contact any of the organisations listed below:



The European Council of Vinyl Manufacturers (ECVM)

Represents the European PVC producing companies and is a division of the Association of Plastic Manufacturers in Europe (APME). Its membership includes the 10 leading European PVC producers which together account for over 95 per cent of Europe's production of PVC resin.

*Avenue E van Nieuwenhuysse 4
B-1160 Brussels
Tel: + 32 2 676 74 43
Fax: + 32 2 676 74 47
www.ecvm.org*



European Plastics Converters (EuPC)

EuPC represents approximately 30,000, predominantly medium-sized, plastic processing operations in Europe. These companies have over one million people on their payrolls, 85% of whom work for companies that employ less than 100 people.

The individual members combine to produce a processing capacity of more than 30 million tonnes of plastic every year.

*Avenue de Cortenbergh 66, Bte 4
B-1000 Bruxelles
Tel: + 32 2 732 41 24
Fax: + 32 2 732 42 18
www.eupc.org*



The European Stabilisers Producers Associations (ESPA)

ESPA represents the whole of the European stabilisers industry through its five branches:

- European Lead Stabilisers Association (ELSA)
- European Tin Stabilisers Association (ETINSA)
- European Mixed Metal Solid Stabilisers Association (EMMSSA)
- European Liquid Stabilisers Association (ELISA)
- European Cadmium Stabilisers Association (ECADSA)

*Avenue E van Nieuwenhuysse 4
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The European Council for Plasticisers and Intermediates (ECPI)

ECPI represents the interests of 26 member companies that are involved in the production of plasticisers. Plasticisers are esters (mainly phthalates) which are used generally in the production of flexible plastic products, predominantly PVC.

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