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UK COMMENTS ON THE EUROPEAN COMMISSION'S GREEN PAPER: ENVIRONMENTAL ISSUES OF PVC

INTRODUCTION

1. The United Kingdom Government welcomes the initiative taken by the European Commission to produce their Green Paper: Environmental Issues of PVC. PVC has been the subject of controversial debate for many years. The Green Paper provides an opportunity for all stakeholders to participate in a focused and informed discussion about environmental and health issues associated with PVC. This will form the starting point for the development of a consistent approach to PVC across Member States, which is important from the single-market perspective.

SCOPE OF THE GREEN PAPER

Life-cycle approach

2. The UK welcomes the desire by the Commission to take a life-cycle approach to PVC, but notes that the focus of the Green Paper is limited to a consideration of a few additives and end-of-life issues. The long-running debate over PVC has identified (although not necessarily justified) wider issues across the entire life-cycle of the material, including emissions of vinyl chloride monomer (VCM), ethylene dichloride (EDC) and dioxins during production and the leaching of phthalates during use. The UK would wish to see a more comprehensive assessment of the entire life-cycle of PVC products (from extraction of raw materials, through manufacture, use, maintenance and disposal) to ensure all concerns have been addressed and to provide a sound basis for decision making.

Additives

3. The Green Paper recognises the environmental and health impacts associated with some of the materials used to manufacture PVC in particular, cadmium and lead stabilisers and some phthalate plasticisers. While these are probably the most significant additives used, the UK notes that there are a wide range of others some examples of which have been listed in the table below.

Function	% by volume in PVC	Additives used
Heat stabilisers	1 – 5	- Lead compounds; - Cadmium compounds; - Organotins; - Barium/zinc compounds; - Calcium/zinc compounds.
Plasticisers (plasticised PVC products only)	30-50	- Phthalates esters; - Aliphatic esters (e.g. adipate, azelate); - Phosphates; - Epoxies; - Trimellitates.
Fillers	10-20	- Silicates; - Barium or calcium sulphate; - Calcium carbonate.
Pigments	1-3	- Metal oxides and silicates; - Organic dyes e.g. azo.
Flame retardants	up to 5%	- Chlorinated or brominated organics; - Antimony oxide.

4. Whilst concerns for human health and the environment have centred around the use of lead and cadmium because of toxicity and a number of the phthalates because of suspicions about endocrine disruption the UK considers that the full range of additives and their impacts should be evaluated. For example, of the substances listed in the table above tri-organotin compounds are endocrine disrupters and some chlorinated or brominated organic flame retardants are persistent, bioaccumulative and toxic.

Waste Management

5. Waste PVC arisings are likely to significantly increase due to the continued growth in use of PVC applications and the appearance of greater quantities of rigid PVC waste as long-life products come up for disposal. However, many of the problems associated with the low recycling rates of waste PVC are common to

other materials, e.g. variable market price, lack of infrastructure supporting recycling schemes and a lack of quality feedstock. These issues are not PVC specific and should be tackled by wider sectoral measures.

6. Concerns about the disposal of waste PVC are mainly due to the additives put into PVC. Phasing out the use of substances in PVC which present an unacceptable risk will reduce the impact that PVC has on the environment at the disposal stage. In the meantime it is unclear what is the Best Practicable Environmental Option (BPEO) for the disposal of waste PVC. Although PVC applications are very diverse in their composition, it may be possible to make broad recommendations for the preferable waste management route for different PVC applications. The four waste management studies did not produce any definitive results on the preferable waste management route for waste PVC and further work should be undertaken as a matter of urgency.

Alternative or substitute materials

7. The Green Paper does not clearly differentiate between substitution of the components of PVC and the substitution of PVC in applications; this distinction needs to be made. While there may be a range of possible alternative materials for certain PVC applications, the Commission's Paper does not include an assessment of the availability, environmental or health impacts of alternative or potential substitute materials. Alternative materials, including commonly used materials such as timber and aluminium have impacts of their own, and while the impacts of PVC have been subject to a considerable amount of scrutiny, there is often very little information available on the impacts of alternatives.

8. The UK considers that the selection of any material for general use should be supported by evidence of its safety. Alternative materials should be subject to the same comprehensive assessment of their life-cycle as proposed for PVC.

UK APPROACH TO THE ISSUE OF PVC

Manufacture

9. Some of the concerns about PVC stem from the impacts of chlorine manufacture using the mercury cell process. Under OSPAR, mercury emission reduction targets for this manufacturing process have already been met and it is intended to phase out the production of chlorine using mercury cells. The shift towards cleaner production has significantly reduced the impact associated with mercury from chlorine production. The UK notes that in the recently published BREF[1] on chlor-alkali manufacturing mercury cell plants are not considered to be the Best Available Technique and that the guidance includes a recommendation to convert mercury cell plants to membrane cell technology, which is less polluting, and uses less energy.

[1] Reference Document of Best Available Techniques in the Chlor-Alkali Manufacturing Industry, IPPC Bureau, European Commission, June 2000.

Additives

10. The UK recognises that a number of chemicals (e.g. lead, cadmium and phthalates) used in the manufacture of PVC products are on the OSPAR list of Chemicals for Priority Action. The Sintra Statement, July 1998, emphasised EU concern about hazardous substances and Member States pledged to make every endeavour to move towards the target of cessation of discharges, emissions and losses of hazardous substances by the year 2020. Implementation will begin with the list of Chemicals for Priority Action and a set of measures is expected by 2003, including substitution of hazardous substances with less hazardous or non-hazardous substances where feasible. As a Party to the OSPAR Convention, the UK recognises the importance of decreasing the input of hazardous substances into the environment and supports the substitution of these hazardous substances where feasible and where sound scientific evidence indicates net benefits. We believe that, particularly for PVC additives included on the OSPAR list, the Commission should take into account existing proposals for legislation to control or phase out these chemicals and make further proposals if necessary. Consideration should also be given to measures resulting from the proposed 'Priority List' under Article 16 of the Water Framework Directive, which contains proposed Priority Hazardous Substances (PHSs) including cadmium.

Alternatives

11. The UK Department of the Environment, Transport and the Regions has commissioned a study to carry out comparative life-cycle assessments (LCAs) of selected PVC applications and some commonly used alternatives which will be published shortly. Typically, LCAs quantify the potential environmental impact of products or systems and do not include an assessment of potential harm to human health. To take this into account, the study took the unique approach of combining life-cycle assessment with risk assessment and an economic analysis of PVC and selected alternatives. The study has been produced from a UK perspective and the results may not be applicable for other MS. However, the study can be used to identify which stages of a product's life-cycle are associated with the greatest environmental impacts and could form the basis for further LCAs on specific PVC uses or products and their alternatives in a European context that would inform a PVC substitution policy. The report of the LCA study has recently been put out to consultation.

VOLUNTARY MEASURES VERSUS LEGISLATION

12. In response to such concerns about PVC the European PVC industry published a voluntary commitment[2] in March 2000 to set out a programme of precautionary measures to address potential risks and help the industry meet the challenge of sustainable development. The UK considers that Member States and the Commission should work constructively with the European PVC industries and other stakeholders, including the NGO community, to build on the commitment. To make this approach most effective, a supporting framework needs to be put in

[2] Voluntary Commitment of the PVC Industry, European Council of Vinyl Manufacturers (ECVM), the European Stabilisers Producers Association (ESPA), the European Council for Plasticisers and Intermediates (ECPI), and European Plastics Converters (EuPC), March 2000.

place for dialogue, determining best practice, setting achievable and measurable targets, monitoring, evaluation and independent verification.

13. The UK is concerned that in the past voluntary commitments, on a range of issues, have failed to deliver results, often because there is no penalty for industry if their targets are not realised. For the European PVC industry commitment to succeed it will be essential that industry are aware that if the targets are not achieved, or if new scientific evidence suggests it is necessary, legislative measures will be implemented.

14. As the Green Paper emphasises, the European PVC industry is extensive and an integral part of the wider chemicals industry. PVC manufacture and processing employs over 500,000 people and has a turnover of more than € 72 billion. The industry is strong in the UK, employing around 50,000 people across the manufacturing and processing sectors, with annual sales of about £5 billion including exports of £1.5 billion. The potential consequences of legislative controls of the industry are considerable, although some adverse effects could be partly offset by new business opportunities. It is therefore essential that the Commission carry out a full assessment of the environmental, economic and social costs and benefits of the different policy options under consideration.

15. Answers to the specific questions raised in the Green Paper are set out below.

INDIVIDUAL QUESTIONS

Question No. 1: ***Which set of measures should be implemented to address the issue of the use of lead and cadmium in new PVC? According to which time frame?***

1. The UK agrees with the Commission that contamination of the environment with cadmium and lead should be avoided to the maximum extent practicable. The European PVC industry have already addressed the concerns over cadmium by agreeing to phase out its use as a stabiliser by 2001. The industry have also begun to address concerns about lead by committing to undertake initial risk assessments of lead-based stabilisers by 2004.

Cadmium

2. We welcome industry's commitment to phase out the use of cadmium stabilisers. In view of this, the UK considers that additional legislative measures for cadmium stabilisers in PVC manufacture are not immediately required. However, delivery of the PVC industry's commitments will be monitored closely with a view to bringing forward legislation as appropriate, particularly to support measures on cadmium developed by OSPAR and under the Water Framework Directive 'Priority List'.

Lead

3. The substitution of lead is already technically and economically feasible in certain applications. In the UK, recent recommendations by the Committee on Chemicals and Materials for Use in Public Water Supply (CCM) will prohibit the future use of lead-based stabilisers and lubricants in the production of PVC-u water supply pipes. This will require the substitution of all lead compounds in PVC-u water supply pipes by 25 December 2003.

4. We would like to see a phase-out date for lead stabilisers backed by legislation as necessary. The toxic effects of lead are well documented and the industry's proposed initial risk assessment will be unlikely to add any new information to our knowledge of the environmental and health impacts of lead. We acknowledge that the toxic effects of lead in PVC are not evident during the use phase but they do become apparent during the waste phase. A number of recent legislative waste initiatives, based on the principle of producer responsibility, have included measures that prevent hazardous substances, such as cadmium and lead, from entering the waste stream.

5. Ideally we envisage the Commission working with industry to agree a phase-out date for the use of lead-based stabilisers in PVC. This is in accord with the approach adopted by the UK Government in the recently published *Sustainable Production and Use of Chemicals - The Government's Chemical Strategy*, which outlines a procedure for the development of risk management strategies through a dialogue between industry and stakeholders. However, we are concerned that voluntary commitments do not provide the impetus for achieving the desired results and we would like the Commission to analyse and evaluate the

implications of achieving the phase-out of lead stabilisers through legislative measures.

Other stabilisers

6. In addition to cadmium and lead, we are aware that concerns have been raised about the use of other stabilisers in PVC. The Green Paper briefly considers organotin compound stabilisers as they account for 9% of European consumption of stabilisers. The UK would like to see initial risk assessments for the use of organotin compounds as PVC stabilisers carried out as a matter of urgency and legislation to prohibit this use brought forward as necessary.

Question No. 2: ***Should specific measures be taken for the use of phthalates as plasticisers in PVC? If so, when and through which instruments?***

1. The UK considers that any decision on the need for further controls on the use of phthalates should be taken in the light of evidence from risk assessments already underway under the EC Existing Substances Regulation (ESR).

2. Some phthalates give rise to a number of recognised problems including bioaccumulation and adverse health effects, while some are suspected endocrine disrupters.

3. Of 1mte/a of phthalates produced, 90% is used to plasticise PVC and 93% of plasticisers used are phthalates. Phthalates are not chemically combined with PVC and are slowly released to the environment during use or disposal to landfill. Concentrations in PVC range from 15-50%. There are also significant releases during phthalate and PVC product manufacture. All large volume plasticiser phthalates are ubiquitous in the environment.

4. Due to concerns about the specific exposure of young children to phthalates, proposals have been put forward by the Commission to restrict the use of six phthalates (DINP, DEHP, DNOP, DIDP, BBP and DBP) in toys.

5. Five of the phthalates currently on the market (DEHP, DIDP, DINP, DBP, and BBP) are being assessed under ESR. Lead countries for these assessments are Sweden (DEHP), France (DIDP and DINP), The Netherlands (DBP) and Norway (BBP). For the first four, completion of assessment is due shortly, while BBP is expected for completion by the end of the year. DEHP and DINP are already well understood in terms of their adverse health effects. DINP as well as DBP and DIDP have no bioaccumulation potential and in other cases (DEHP and BBP) the potential effects on the environment are still being assessed. It is important that these risk assessments be completed in good time and progress kept under review.

6. The ESR assessments should provide information on the contribution of phthalates from PVC to levels in the environment and identify the need for general or product-specific measures for some or all phthalates in PVC. Such controls could vary according to the type of product application, concentration in product, type of phthalate and so on.

7. The Commission paper acknowledges that information is limited on the impact of alternative plasticisers, such as adipate and citrates, from their use in PVC, so further data is required for a proper assessment. This should be obtained in co-operation with industry as a matter of urgency.

Question No. 3: ***Which set of measures would be the most effective to reach the objective of an increase in PVC recycling?***

1. From the UK's perspective, the problems with PVC recycling described in the Green Paper are similar to those affecting recycling in general. The two main reasons for the lack of commercial success for PVC recycling are a variable market price, which at its lower end will not support recovery, and a lack of feedstock of suitable quality. It is notable that the relevant commitment in the PVC industry's March 2000 voluntary agreement is to recycle 50% of *collected* pipes, fittings and window frames by 2005 (probably totalling 30kt).

2. If this is to be addressed, it will be necessary to consider what can feasibly be done to encourage the collection and segregation of PVC waste to provide bulk feedstock for recycling facilities. Considering the wide distribution of PVC waste arisings it would appear that a network of collection and sorting facilities analogous to that serving the scrap metal industry would be required. This would need further detailed investigation, particularly as it would probably need some form of subsidy, in the initial stages at least. Further consideration should be given to the marking of PVC products as a useful tool to facilitate the separation of PVC waste from the general waste stream. Industry should expand their voluntary commitment to include marking products as an objective.

3. The UK notes that the majority of post-consumer PVC waste recycling is down-cycling. While we recognise that down-cycling of PVC waste allows the re-use of a waste material, it considers high quality recycling as a preferable waste management option wherever feasible.

4. There may be greater scope for cost-effective progress by focusing on industrial waste streams with a relatively high and "clean" PVC component. The Packaging and Packaging Waste Regulations, Waste from Electrical and Electronic Equipment and End of Life Vehicles Directives all contain relevant provisions. Other sources could include construction and demolition waste, window and door installers and the like.

5. On balance, the UK considers that the best way forward is to discuss an extension of the PVC industry's existing commitment on recycling, making the necessary links with current sector-specific EC legislation. Member States could back this up with national action to promote recycling as necessary. Industry should be asked to submit detailed plans on how they intend to implement the voluntary agreement. The plans could usefully include information on the collectable and available sources of PVC waste for recycling and clarification of what waste industry would be targeting.

6. Again the importance of a feedback mechanism for progress on the voluntary commitment must be emphasised. If insufficient progress is made in achieving the targets outlined in the voluntary commitment, the Commission should consider the possibility of introducing EU-wide recycling targets for those particular waste streams.

7. In addition, there are numerous cadmium-containing PVC window frames in existence in the EU; again, the draft Green Paper notes that cadmium will *probably* remain bound in PVC during the use phase. There is no risk assessment for the disposal of these frames and, until more satisfactory methods of disposal have been identified, it would seem appropriate to permit their continued recycling. Industry should be asked to demonstrate that cadmium and lead do remain bound during the use phase and also during disposal to landfill.

Question No. 4: ***Should specific measures be attached to the mechanical recycling of PVC waste containing lead and cadmium? If so, which ones?***

1. It is questionable how far this is a problem since the Green Paper says heavy metals are not directly released into the environment during the recycling process. Depending on the outcome of future risk assessments for disposal options for such stabilisers, it may be that recycling is to be preferred.

2. Apart from that, it is not clear whether PVCs are readily identifiable by product type to permit sorting without analysis. If any limitations on recycling were to be justified, it would probably make sense to tackle this through the development of appropriate standards (as set out in option 3.4).

Question No. 5: ***Which set of measures would be most appropriate for chemical recycling of PVC waste?***

1. Chemical recycling faces similar market difficulties to mechanical recycling. In particular, chemical recovery competes with the cheaper options of landfill, incineration and co-combustion .

2. However, the PVC industry is doing valuable work to develop suitable chemical recovery processes (option 5.1) including the mechanisms for bulk feedstock collection and preparation. These include the pilot plant for "PVC rich" waste, mentioned in the industry voluntary commitment, that is due to be up and running in 2001 and deliver test results by 2002. In the UK (Scotland), a small pilot plant has already been successfully trialed which is designed to recover mixed plastic waste as a petrochemical refinery feedstock.

3. The progress on such research and development is encouraging. There appears to be no sound basis for setting targets for chemical recycling, mandatory or otherwise, at this stage.

Question No. 6: ***Which set of measures would be most effective to address the issues linked to the incineration of PVC waste?***

1. In the UK most PVC waste goes to landfill and only a relatively low proportion is incinerated. Nonetheless, we recognise that a number of issues need to be addressed here. We think it is important that the potential relationship between PVC incineration and dioxin formation should be properly understood. Much research into this relationship has already been undertaken and we note that it is most likely that the main incineration parameters, such as temperature and oxygen concentrations, have a major influence on dioxin formation. We support the proposal for further research on this relationship, including comparative research on pyrolysis and gasification operations (option 5). However, to avoid duplication, a literature review should be undertaken as a priority. The UK notes that emissions of dioxins from modern incinerators are typically very low. However, the impact of PVC on dioxin production from uncontrolled, or open-burning is less well understood and this too should be examined.

2. The Green Paper summarises the Commission's recent study of the costs and benefits of various scenarios related to the diversion of PVC waste from incineration to recycling or landfill. The analysis in the study appears reasonably sound, although it is unclear how the recyclate prices used were determined and some further sensitivity analysis would be in order since recycling prices are notoriously volatile and variations would have reversed some of the conclusions of the study. Also, the study and the Green Paper appear to overestimate the costs associated with incinerating PVC in Municipal Solid Waste (MSW). The assumption is made that the entire cost of controlling emissions of hydrogen chloride from the incineration of MSW, and of treating and disposing of the residues so produced, could be avoided if PVC were removed from the waste stream. That seems unlikely as waste will contain other sources of chlorine in addition to PVC.

3. We would support the encouragement of cleaner technologies as proposed in option 4 and note that the PVC industry has already committed itself to support technological developments in this area, if not to any clear figures or dates. Research, development and the spreading of best practice will clearly be important. They should be supported by relevant guidance in the IPPC BAT Bref on incineration that is currently being drafted.

4. We consider that alternatives to the incineration of PVC waste should be explored further, although we would agree that in general it would be preferable for PVC to be recycled rather than incinerated. We could therefore support efforts to find economically feasible ways to divert this waste from incineration on a non-mandatory basis. As discussed earlier, diversion for recycling is most likely to be feasible for discrete sources such as demolition, window and door installers. Subject to the discussion at Question 4 above, it appears environmentally preferable for the sort of rigid PVC that often arises from such sources to be recycled rather than disposed of through incineration.

Question No.7: ***Are specific measures concerning the landfilling of PVC waste necessary? If so, which ones?***

1. The UK considers that there is currently only very limited evidence to suggest that any environmental problems result from the landfilling of flexible PVC. However, we accept that the debate has not yet ended and would support the undertaking of further research on the leaching or emission of additives in landfill conditions. Policy on this topic will also need to take account of the continuing risk assessments on phthalates (Question 2).

Question No. 8: ***Which are the appropriate instruments for developing a horizontal strategy on PVC? Should a PVC substitution policy for some specific applications be envisaged? If so, how?***

Development of a horizontal approach:

1. The Commission's Green Paper did not address the life-cycle of PVC as a whole but specifically considered the issues of waste management and some additives. Therefore the case for a horizontal approach has not yet been made. As a first step this needs to be done.

2. Until this is done it is hard to answer the question. However, the methodology employed in life-cycle assessment may be used to identify which stages of a product's life-cycle are associated with the greatest environmental impacts and this can provide the focus for attention in any horizontal approach.

3. In general the UK would favour the implementation of voluntary measures backed by a clear feedback mechanism and appropriate procedures for monitoring progress. However, we are concerned that progress will not be forthcoming unless there are obvious penalties for industry. In this respect we would wish to see the Commission analyse and evaluate the implications of achieving a phase-out of lead-based and other hazardous stabilisers through the use of legislative measures.

PVC substitution policy:

4. We note that the Commission's paper focuses solely on PVC and makes no attempt to consider the environmental or health effects of alternative/substitute materials. Direct comparison of their effects to those of PVC is therefore not possible at this stage. However, we also acknowledge that it can be time-consuming and difficult to make comprehensive comparisons between products, especially for disimilar characteristics. The UK recognises the huge range of diverse applications of PVC - and that it would not be possible to consider all possible alternatives for all uses.

5. We consider that substitution may be appropriate for certain PVC additives and products. However, the case has not been properly made in the Green Paper. A potential substitution policy for certain PVC additives or products would need to be based upon sound scientific evidence and be based on a comparative analysis of any potential alternatives/substitutes. We are not convinced at this stage that a case has been made for a substitution policy based on legislative measures. The paper suggests those applications selected for substitution would be those 'which cannot be separated from the general waste stream and those which are difficult to recycle such as in packaging, motor vehicles, electric and electronic goods'. These examples seem unnecessary as legislative measures are in place or foreseen to separate out these wastes from general wastes.

6. As a possible way forward the Commission could identify those PVC uses or products which are the subject of genuine concerns and carry out a full lifecycle assessment of their impacts and compare them with those of alternative materials. Comparisons should include: health and environmental impacts, impacts of associated additives or maintenance requirements – e.g. wood preservatives; feasibility of changing to the alternative (e.g. medical products – few suitable alternatives exist, electrical equipment - fire resistant properties essential); and economic implications of substitution.

7. The idea of "substitution" could be a particularly useful element, if targeted on applications, which are less amenable to more generic measures. It might, for example, be a good route to promote for the additives used in PVC. But all of this needs to be based on good LCA of likely alternatives.