PVC - no time to waste! (October 2000)

PVC - the poison plastic

The manifold hazards of PVC (polyvinyl chloride) throughout each step of its lifecycle always go back to the same two causes that are *specific* for PVC: it is made out of chlorine, and it requires large amounts of additives to be functional.

The *chlorine* trap: Pure PVC consists of 57% of chlorine. All chlorinated precursors of PVC (chlorine, ethylene-dichloride, vinyl-chloride monomer) are highly toxic, and their production generates toxic wastes and emissions. The combustion of PVC - be it in accidental fires, waste incineration or metal recycling - leads to the formation of hydrochloric acid and dioxins, the latter being the most poisonous synthetic chemical known to man. When burnt in an incinerator, the chlorine content of PVC is transformed into hydrochloric acid, which needs to be neutralised by the addition of lime. This leads to the absurd effect that the incineration of 1 ton of PVC can lead to the formation of *more* than 1 ton of secondary residues - residues that are classified as hazardous waste. Finally, chlorine makes PVC recycling incompatible with the recycling of other plastics. While most of PVC's infamous high-volume organochlorine relatives, such as CFCs, PCBs, and DDT have been banned, the production of PVC continues to increase.

The *additive* trap: Pure PVC is useless. Hard PVC requires the addition of stabilisers; soft PVC requires the addition of softeners and stabilisers. Commonly used stabilisers are toxic lead, cadmium and organotin compounds; commonly used softeners are toxic phthalates. These additives leach out of PVC during use and disposal. The toxic phthalates used to soften PVC have become the most abundant man-made chemicals in the environment. The presence of a multitude of different additives creates incompatibilities during recycling - different PVC waste streams need to be separated from each other prior to recycling, or will otherwise lead to low-quality downcycling. The recycling of PVC containing toxic additives results in an uncontrolled spreading of these additives into new products.

In summary, the PVC building block chlorine and PVC's need for high amounts of additives not only create major hazards during production and use, but also leave no viable waste treatment option. Even if all PVC additives were non-hazardous, the key ingredient chlorine disqualifies PVC as a sustainable material.

PVC - key findings of the five EU studies

The key hazards presented above have been documented and proven by the five studies on PVC waste management of the European Commission.

- **PVC wastes on the increase**: The amounts of PVC wastes are projected to increase more than 80% over the next 20 years, from 4.1 to 7.2 million tonnes/year. Almost 90% of these wastes are post-consumer wastes.
- **Incineration – making things worse**: Incineration of 1 kg of PVC in the EU creates on average 0.8-1.4 kg of *hazardous* wastes (in incinerators with non-wet flue gas treatment) and 0.4-0.9 kg of residues in liquid effluent (in incinerators with wet flue gas treatment). Hazardous waste from PVC incineration will also be more likely to contaminate the environment, as PVC increases the amount of leachates and leachable salts in this waste significantly. Incineration of PVC creates additional costs between 20-335 Euro/tonne. PVC is responsible for 38 to 66% of the chlorine content in municipal solid waste. The formation of dioxins due to PVC has been beyond the scope of the study. Diverting PVC from incineration always leads to environmental improvements. Nevertheless, PVC incineration is estimated to increase more than fivefold over the next 20 years in a business-as-usual scenario, from currently 0.5 million tonnes/year to 2.6-2.9 million tonnes/year.
- **Landfilling - the ticking time bomb**: Landfilling of PVC results in the release of hazardous softeners. Releases of hazardous stabilisers cannot be excluded. These releases will occur for a very long period of time - longer than the guarantee of the technical barrier of the landfill. PVC waste will furthermore contribute to the formation of dioxins and furans in landfill fires.
- **Recycling – not solving the problem, and problematic in itself:** Recycling was found not to be qualified to contribute significantly to the management of PVC waste in the next decades, reaching at most 18% of total waste in 2020. Assuming that the maximum potential of PVC recycling is achieved, incineration of PVC waste would still increase more than fourfold to 2.2-2.5 million tonnes in 2020. Current recycling rates are at less than 3%. Most current recycling (2%) is downcycling - the recycling of PVC into low quality recyclates that do not replace virgin PVC - and therefore has no environmental benefits. Almost all PVC wastes contain hazardous additives. Recycling these wastes leads to a spreading of these hazardous substances into new products. High-quality recycling of PVC wastes without spreading lead, cadmium or PCBs into the recyclates is estimated to reach a maximum of 5% by 2020. Chemical recycling was found to be not economically viable.

PVC - recent political initiatives

While the Commission studied the problems of PVC in waste, several governments started to take national initiatives to tackle the problems of PVC.

Sweden (April 1999): Adoption of a new chemical strategy
The strategy includes deadlines for phase-outs of several PVC additives (lead, chlorinated paraffins, phthalates and other plasticisers, tin stabilisers) and a ban on phthalates in toys for children under three.

Denmark (June 1999): Adoption of a PVC strategy
The aim of the strategy is to limit incineration of PVC and includes an action plan for reducing and phasing out phthalates in soft plastics, a ban on lead stabilisers, substitution of PVC-products that are difficult to separate from the common waste stream and tight measures to avoid donwcycling of PVC waste into products of inferior quality.

Germany (June 1999): Recommendations of the German Environment Protection Agency (EPA) on PVC
The German EPA studied PVC in the light of sustainable material policy. It recommended a number of areas, where action was needed, i.a. a gradual phase out of soft PVC, no landfilling of PVC, no spreading of hazardous substances via recycling, phase outs of cadmium and lead, and the use of chlorine-free materials in certain inflammable areas.

Recent restrictions at EU level are so far limited to an emergency ban on the use of six phthalates in PVC teething toys.

PVC - recent business initiatives

While the trend in companies to phase out the use of PVC began in the early 90's with furniture retailer Ikea and toy manufacturer Lego, and was continued by big supermarket chains (Migros, Tengelmann) and water bottling companies Nestle (owner of i.a. Perrier and Vittel) and Evian, a number of multi-national companies in a variety of sectors have joined the PVC-free movement in recent years in addition to numerous national companies (: "PVC-Free Future: A Review of Restrictions and PVC-free Policies Worldwide" - full report available on www.greenpeace.org/~toxics/)

- 1998: Nike, German Telekom, Sony, Chicco
- 1999: Baxter Healthcare, General Motors, Ford, Mattel,
- 2000: Sydney Olympics

What does Greenpeace demand?

PVC has no future in a sustainable society, as it is unavoidably linked to the generation and release of a variety of hazardous substances. The multiple life cycle hazards of PVC are more than well known. Current amounts of PVC are causing major problems in incineration, landfill and recycling. And the worst is yet to come, as most of the PVC that has been produced in the past is only now starting to enter the waste stream due to its average life span of ca. 34 years.

As if this was not enough, industry continues to put more and more PVC on the market. Since the European Commission committed to study the problems of PVC in July 1997, more than 25 million tons of PVC products have been sold in Europe - 22,000 tons per day, 250 kg per second. There is no more time to waste, every second lost adds a sizeable proportion to the unsolved problem. Alternatives are widely available, often offered by the same companies.

While there is a growing trend in businesses worldwide to go PVC-free, EU regulators lag seriously behind. Strong EU action is needed immediately, firstly to stop the problem from growing bigger and bigger, and secondly, to ensure that the treatment of PVC wastes does not harm the environment nor human health.

Greenpeace advocates that the following measures be taken against PVC:

- short-term action:
  - phase out of short-lived PVC uses such as packaging and toys,
  - phase out of PVC medical devices, for which alternatives are available,
  - phase out of the use of hazardous stabilisers and softeners,
  - ban on incineration and landfilling of PVC wastes,
  - ban on recycling of PVC containing hazardous additives, and
  - producer responsibility for the separation of PVC from the general waste stream and temporary storage until a waste solution has been found and implemented by the producer
- mid-term action
  - develop and implement programme on phase out of entire PVC production.

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27 July, 2000
Brussels

GREENPEACE

The deliberate smokescreen
alias
The voluntary commitment of the PVC industry

Introduction
A voluntary commitment is the industry's standard means of last resort to stop the regulator from proposing legislation when all lobbying has failed. It seems to offer an attractive way out for the regulator: why should he act if industry is acting on its own?

However, voluntary commitments rarely contain more than 'no-regrets' measures - measures that are in the industry's economic interest anyway. In most cases, the industry defines the objectives, hereby steering the agenda according to their priorities, and not according to what action is really needed to protect the environment and human health. The objectives do not normally cover the key problems but try to distract from them by offering action on peripheral aspects. The public is excluded from the process and there are no possibilities to enforce the industry's promises. And all too often, the little that is offered is not even fulfilled.

Voluntary commitments are perfect for the industry: they promise little and in return the regulator does nothing. If the commitment is accepted, legislative action is postponed, at least for some years, maybe forever, and industry can continue with business as usual. And if industry fails to fulfil even the little it committed to, it won't face any consequences apart from getting the legislation that was proposed earlier.

The Danish example
In October 1988, the Danish Minister of the Environment presented an Action Plan on PVC. However, the Danish industry reacted quickly and in 1991 managed to turn the Action Plan on the reduction of PVC into an 'Agreement regarding the use of PVC'.

The objective of the PVC Agreement has been *inter alia* to keep PVC away from incineration plants by reducing the use of PVC in packaging and other products, and by increasing the recycling of building products. According to the PVC Agreement, enterprises must be responsible for, and finance, the establishment and operation of organisation(s), which set up recycling schemes for building and construction products containing PVC.

Almost ten years later, in June 1999, the Ministry for Environment and Energy reported the following:

> "*Enterprises have not lived up to the Agreement in financing collection schemes for all building products covered by the PVC Agreement. Consumption of building products and other products, except for packaging, is increasing. …The total amount of PVC waste is expected to increase in coming years.*"
>
> "*A voluntary scheme, financed by industry, which covers all building and construction products, has not been established. This is clearly unsatisfactory, and on this basis the EPA consider it now necessary to establish regulation of waste with a view to keeping PVC away from incineration plants*."
>
> "*Overall, the result of the PVC Agreement initiative is not satisfactory and there is a need for supplementary measures. These will include regulation of the waste area as described in WASTE 21, and also other limitations so that the amount of PVC does not increase. In this way the bases for the PVC Agreement of 3 April 1991 have changed, and they will be formally replaced by the strategy in this Report.*"

With the PVC Agreement, the Danish PVC industry succeeded in postponing legislation for more than a decade. During that time, they have continued to expand happily. Thus the environment has not been protected. The Danish Government is now back at square one, while the environmental problem is even bigger than before.

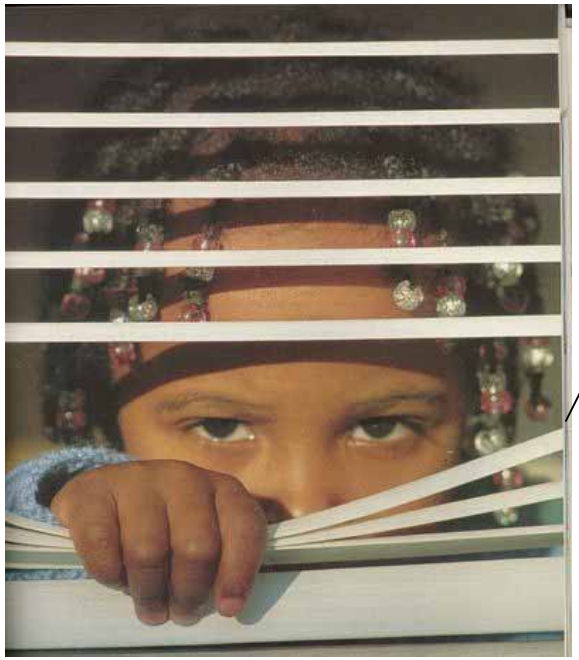
Voluntary commitment of the European PVC industry

Has the European PVC industry learnt from the Danish example? Yes - they commit to hardly anything. This lowers the risk of being caught later on for not living up to their commitments.

Recycling in general	The industry is making no commitments on total recycling amounts, but only presents expectations. According to their expectations, the total amount of PVC recycling would reach up to 200,000 tonnes in 2010. This represents an increase from the current PVC post-consumer waste recycling rate of 3% to around 4% in 2010 (PVC post-consumer waste projected for 2010: 4.7 million tonnes). 96% of the PVC waste would still go to incineration or landfill. And the fulfillment of their meagre expectations - a negligible increase in the recyling rate of about 1% in 10 years - depends on others. For this recycling volume to be reached, they request support from public authorities to create and organise waste collection schemes. But waste collection represents the crucial precondition and the most expensive part of recycling.
Recycling targets for pipes and windows	The PVC industry commits to recycle in 2005 50% of windows and pipes. These two applications represent only 4% of the total PVC post-consumer waste arising in 2005. The PVC industry does not make these recycling quotas depend on the total of these wastes arising, but on the amounts of waste collected. As the PVC industry takes no responsibility for collection of these wastes (see recycling in general), the targets become meaningless.
Recycling of PVC with hazardous stabilisers	PVC waste pipes and windows contain hazardous stabilisers such as *inter alia* cadmium and lead compounds. Recycling these wastes would result in the dispersion of these substances into new products. The PVC industry finds no fault with this.
Recycling of other PVC applications	The PVC industry admits that there are problems with the recycling of applications other than windows and pipes. These other applications however represent more than 95% of the PVC waste arising in 2005.
Plasticisers	The PVC industry promises to continue to do research and to help policy-makers develop well-informed decisions at the earliest possible time. They will take appropriate risk reduction measures, if warranted by the result of EU risk assessments. In other words, the PVC industry commits to continue lobby policy-makers and to follow the law.
Cadmium	Members of the European Stabiliser Producers Association commit to stop selling cadmium stabilisers to the European Union, Norway and Switzerland, but say nothing about exports. Members of the European Plastic Converters are merely asked not to use cadmium-based stabilisers. In other words, the Plastic Converters can continue to use cadmium stabilisers if they wish and no targets are set to reduce their use.
Lead	The PVC industry state that based on the *current* PVC volume, the 120,000 tonnes of lead stabilisers sold in Europe in 1999 are anticipated to decrease to 80,000 tonnes in 2010. But based on the *projected* PVC volume by the European Plastic Converters (plus 32% in 2010 - see Prognos study), that would mean 105,000 tonnes of lead stabilisers sold in 2010. In other words, the PVC industry will continue to use high amounts of lead stabilisers.
Incineration	The PVC industry wants to promote the incineration of PVC wastes in the disguise of energy recovery. According to the study by Bertin Technologies, incineration of municipal solid waste without PVC results in a profit of around 15 Euro/tonne from energy recovery. Burning PVC on the other hand costs between 20 to 330 Euro/tonne. So PVC incineration can hardly be called energy recovery. The costs come from the flue gas treatment needed for PVC. This treatment creates significant amounts of hazardous waste (0.8-1.4 kg/kg PVC in non-wet flue gas treatment) - often more than what went into the incinerator in the first place. The industry tries to distract from this absurdity by referring to these hazardous wastes as "salt residues". They want to support technology developments to minimise the quantities of salt residues and to develop purification technologies for them. These promises illustrate that incineration of PVC makes the problem even worse: the increased quantity and hazard of the waste from PVC incineration requires further treatment.
Landfilling	The problems of landfilling are not addressed in the voluntary commitment.

The voluntary commitment of the PVC industry represents a classic example of attempting to distract from the key environmental problems. The industry presents concrete action on only two specific waste streams. These account for 4% of the PVC waste arising in 2005. But the industry does not take any responsibility for the very prerequisite for achieving these targets: waste collection. This makes these promises meaningless. The commitment reveals that the industry is not prepared to discontinue the use of hazardous additives and that it wants to promote incineration. It has to be regarded as a cynical attempt to stop the regulator from taking effective action against PVC by offering business as usual.

The PVC waste crisis



No time to waste!

Axel Singhofen
EU Toxics Advisor

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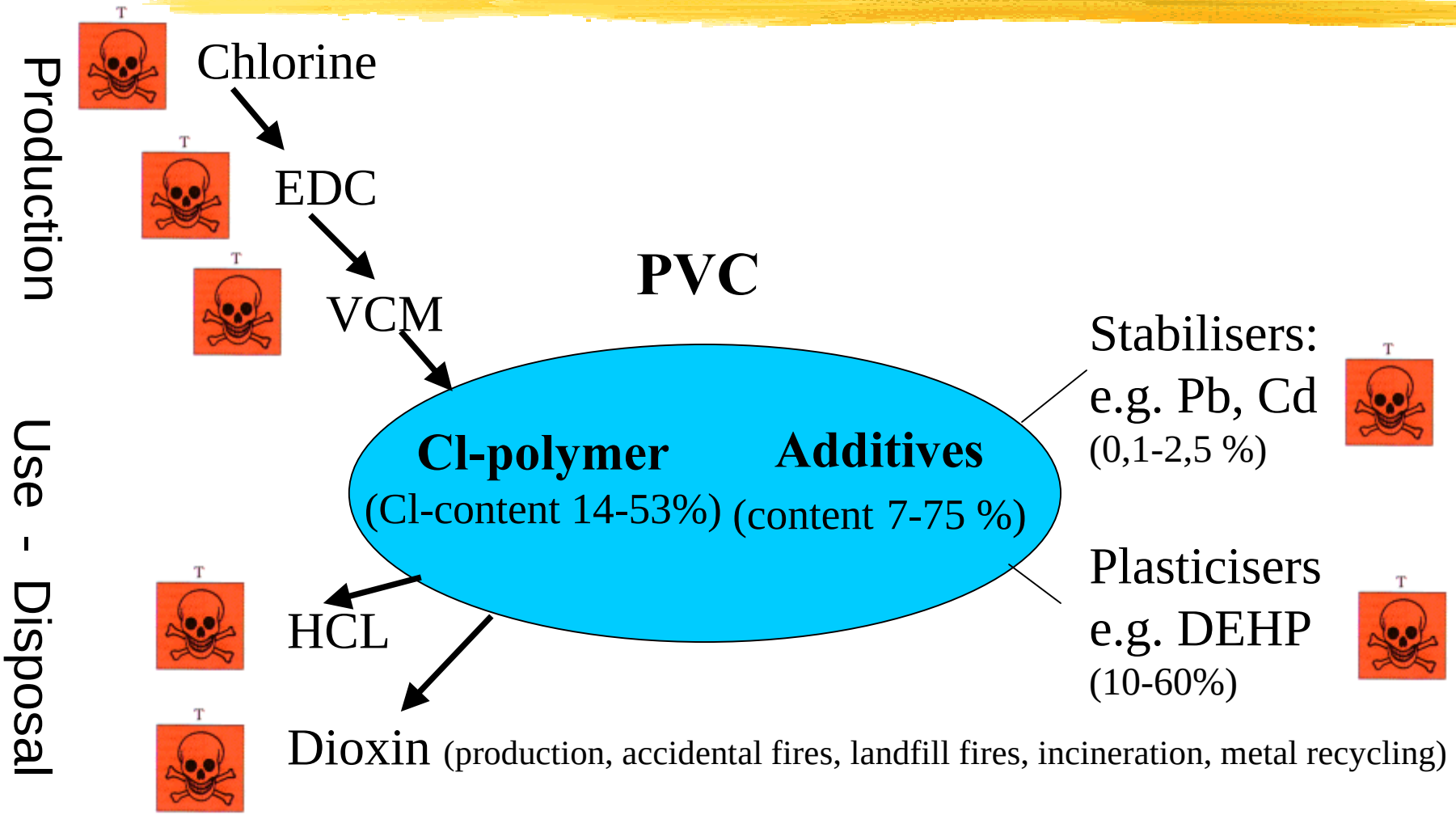
PVC Industry:"Green Paper raises no significant issues specific to PVC"



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ECVM:" The conclusions of the studies are favourable to PVC"

- *Prognos*: wastes to increase 80% by 2020
- *Prognos*: "Mechanical recycling not qualified to contribute significantly to the management of PVC post-consumer wastes"
- *Argus*: "Release of plasticisers from PVC… under landfill conditions [and] during use…is widely recognised in the literature"
- *Argus*: "PVC products disposed of in landfills will certainly contribute to the formation of PCDD/PCDF"
- *Bertin*: Hazardous resid. of PVC incineration: 0.8-1.4 kg/kg PVC, 185-335 ∈/t (non-wet APC)
- *AEA*: "In all cases the environmental consequences of diversion from incineration lead to environmental improvements"

Some key findings of the studies

=> there is no safe disposal of PVC!

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PVC Industry:"[The voluntary commitment] will deliver improved product stewardship more quickly and effectively than any other approach"

- "*it is anticipated that the total recycled will reach up to 200,000 tons of PVC waste in 2010*"
  - = ~4% of projected waste amount 2010 (+ 1% compared to 2000: ~ 3%)
  - → **96% of the wastes still go to landfill/incineration**

- "*For this recycling volume to be reached, there is a need for support from public authorities to create and organise appropriate waste collection schemes*"
  - = collection is crucial precondition and most expensive part of recycling
  - → **key responsibility for 4% recycling not assumed**

⇒ The voluntary commitment does not lead to any improvements

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PVC Industry (March 2000): "The PVC industry employs 530,000 people in Europe"

- ECVM (December 1997): "*The PVC industry in Europe employs about 200,000 people (direct and indirect*)"
  - 165% growth in 2 years? - one of the figures must be incorrect!
- Green Paper: 96% of the jobs are in the PVC transformation sector
  - change to another material would not endanger these jobs!
  - Prognos (1994): PVC-Conversion would result in net job creation
- Major PVC producers heavily invested in alternative plastics
  - PVC phase-out would only mean shift in investment, not loss of jobs!

⇒ PVC phase-out: creates sustainable employment

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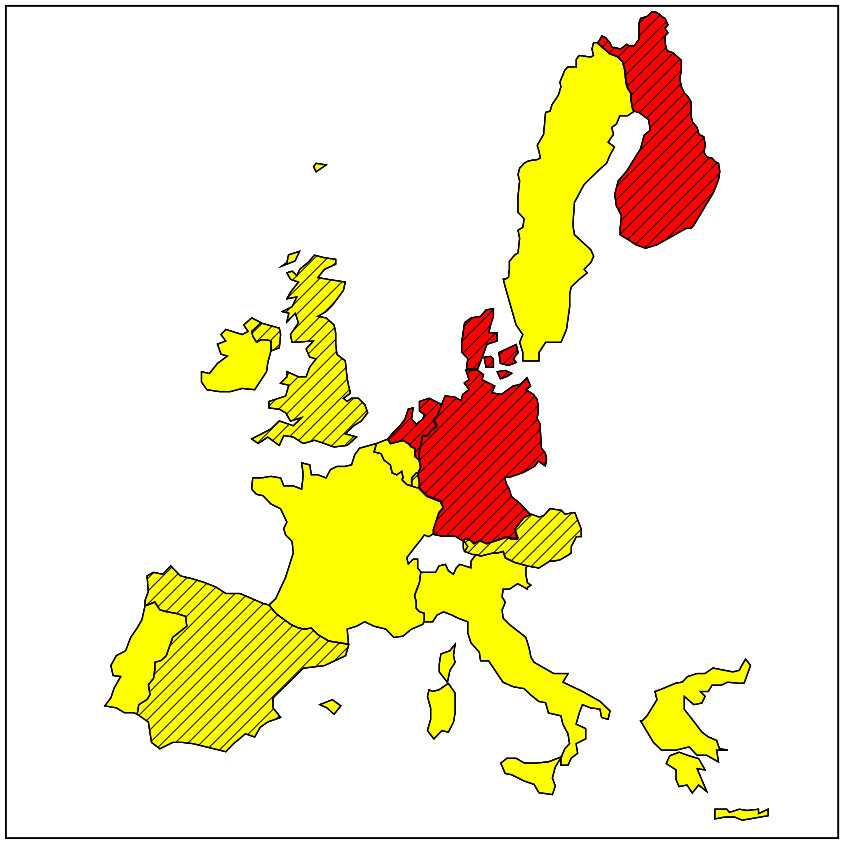
PVC-free political initiatives in the EU

- EU emergency ban of six phthalates in soft PVC teething toys

- Restrictive policies at national level in place or recommended (DK, S, NL, D)

- PVC-free policies at regional or local level (DK, S, NL, D, UK, A, Spain, Lux)



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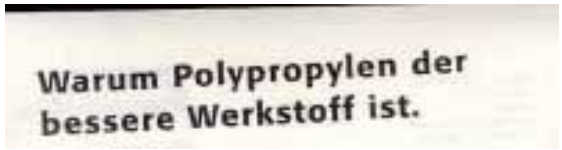
PVC-free business initiatives

Baxter
GM
LEGO
MATTEL
SONY
Ford
IKEA
SPA
Sydney 2000
T

Wavin: No. 1 PVC pipe producer in Europe



"Why polypropylene is the better material"

"a standard plastic has been questioned increasingly in recent years due to its chlorine content: PVC"

"Rightly, polypropylene is called the 'material of the future'. Because in addition to its excellent characteristics, it has all the advantages for ecologically clean reprocessing"

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Conclusions

- Major problems specific to PVC have been shown by EU studies:
  - recycling does not solve the problem
  - landfill + incineration of PVC have major adverse environmental impacts
- National/local authorities take action against PVC
- Big Business moves out of PVC
- The “Voluntary Commitment” of the PVC Industry does not address the problems, promotes business as usual

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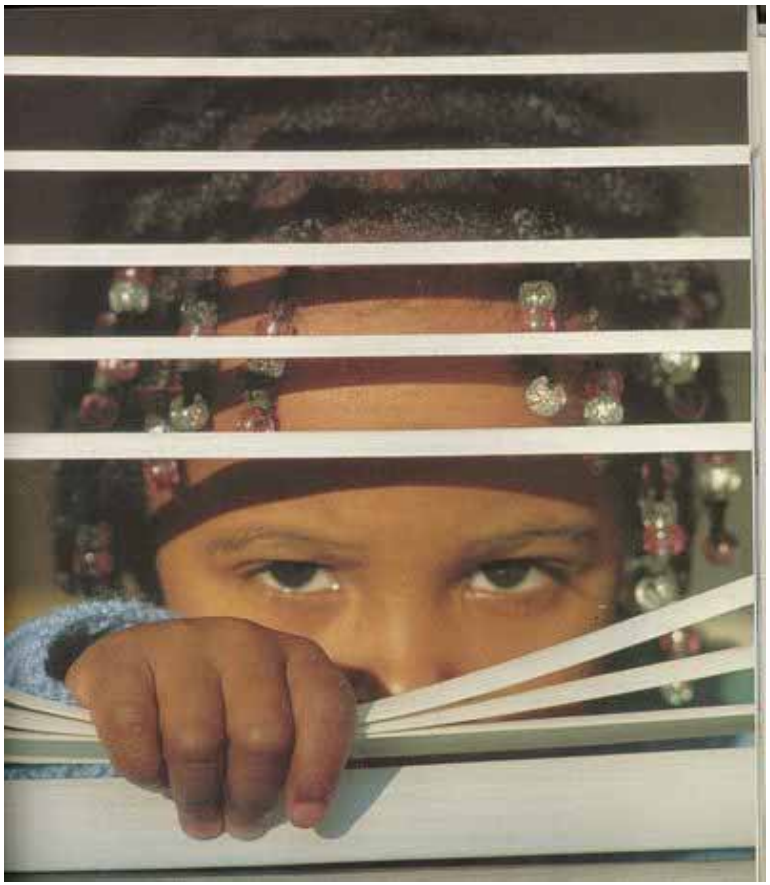
Greenpeace requests



- **Do not leave it to the next generations!**
  - Start phasing out PVC now!
- **Do not make the existing problem worse!**
  - producer responsibility for separation of PVC from general waste stream
  - ban on incineration of PVC
- **Take full legal action, no voluntary commitments**

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PVC life-cycle hazards at a glance

Production

Massive energy requirements for chlorine production
Mercury emissions/asbestos wastes from chlorine production
Toxic wastes from manufacture of ethylene dichloride (EDC) and vinyl chloride monomer (VCM)
Worker's exposure to VCM
Toxic additives
Accidental spills/leaks/explosions

Use

Additives migration
Accidental fires (hydrochloric acid/dioxins)

Transportation

Accidental spills/leaks/explosions

Landfill

Leaching of plasticisers and stabilisers from soft PVC
Leaching of stabilisers from hard PVC cannot be excluded
Leaching longer than life expectancy of technical barrier of landfill
Possibility of toxic gaseous emissions from plasticisers
Accidental landfill fires (hydrochloric acid/dioxins)

Incineration

Toxic emissions (e.g. hydrochloric acid/dioxins)
Large amounts of hazardous secondary residues (0.8-1.4 kg/kg PVC in non-wet flue gas cleaning)
Increased formation of leachate and leachable salts from hazardous secondary residues
High costs of flue gas cleaning

Recycling

Low recycling rates (currently 3%, 2/3 of it downcycling),
Low recycling potential (18% by 2020; 5% by 2020 under ecological conditions = no toxic additive transfer, no downcycling)
Disturbs recycling of other plastics
Diversity of additives prevents high quality recycling of PVC from different applications/different years of production
Contamination of metal recycling (dioxin)
Mechanical recycling is costly due to extensive separation needs
Chemical recycling is not economically viable

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