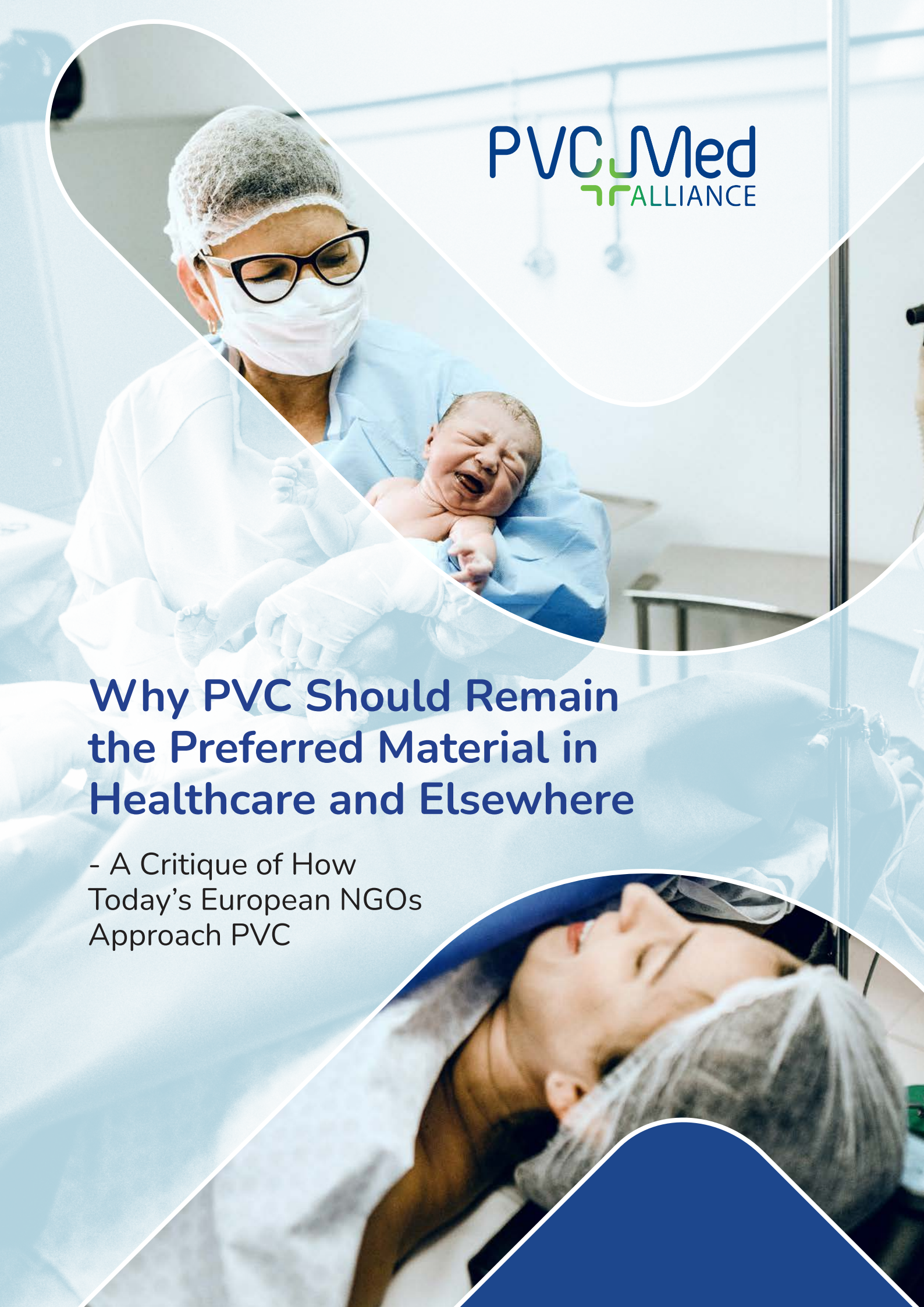
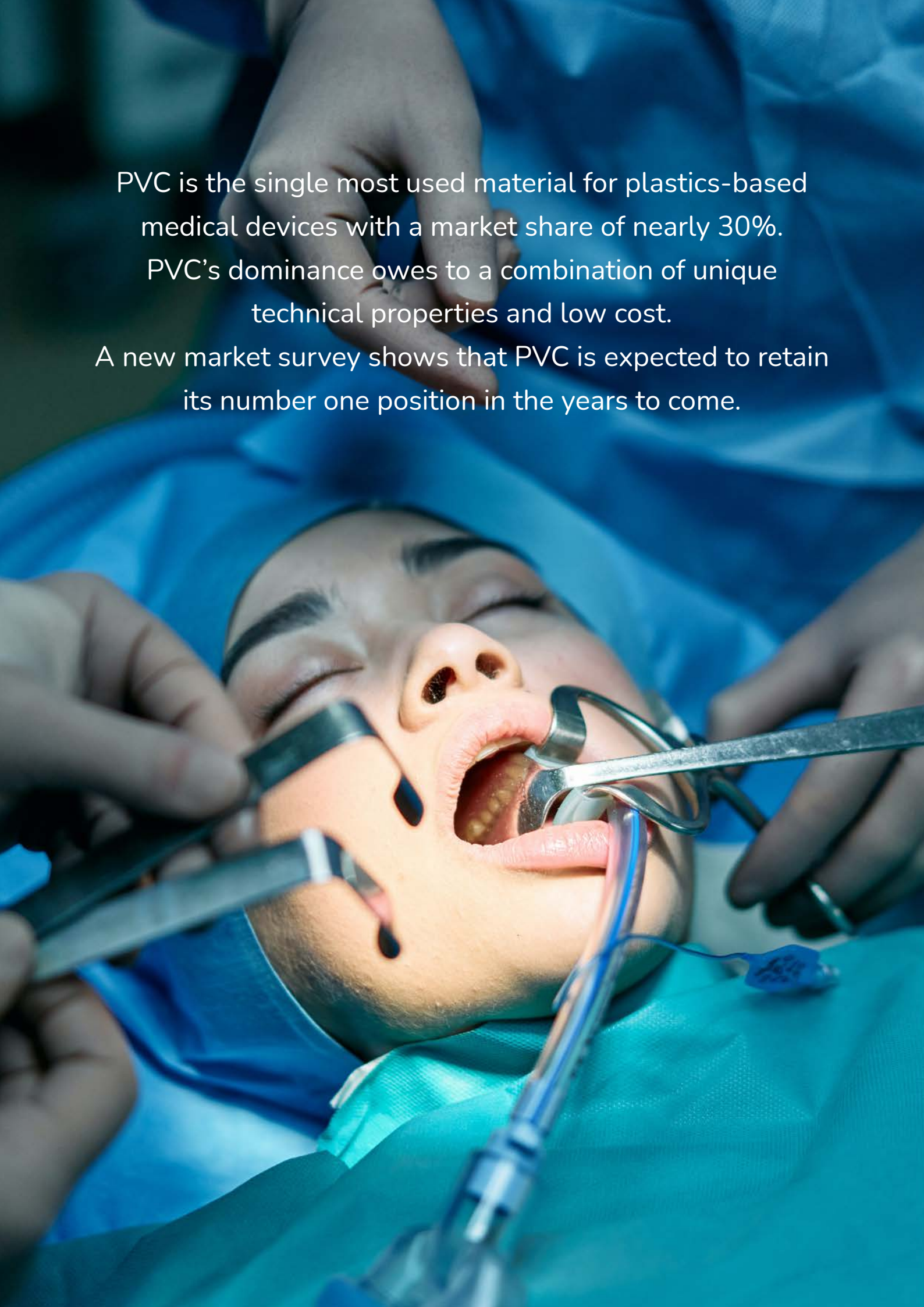


PVC Med ALLIANCE

Why PVC Should Remain the Preferred Material in Healthcare and Elsewhere

- A Critique of How Today's European NGOs Approach PVC



PVC is the single most used material for plastics-based medical devices with a market share of nearly 30%. PVC's dominance owes to a combination of unique technical properties and low cost.
A new market survey shows that PVC is expected to retain its number one position in the years to come.

EXECUTIVE SUMMARY

Plastics in general and PVC in particular are often the topic of environmental debates. As PVC is still considered a controversial plastic material, it is only natural that many different stakeholders are expressing their opinion. Healthcare NGOs especially have been critical towards the use of this widespread plastic material.

After reviewing the latest NGO papers on PVC, we in PVCMed Alliance have decided to give an update on the PVC situation, mainly based on official Scandinavian sources. In the following pages you will find:

- **A detailed critique with extensive documentation of why today's NGOs are wrong in their approach to PVC.** Things have changed since the late 1990s when Greenpeace managed to move the European PVC industry in the right direction based on scientifically sound arguments. We argue that today's NGOs lack scientific rigour in PVC matters and that European policy makers therefore should read PVC critique from NGOs with strong reservations.

- **Documentation for why PVC is irreplaceable in healthcare and elsewhere.** A new market survey shows PVC is the single-most used plastic for medical devices and will remain so in the years to come. Groundbreaking recycling initiatives for PVC-based medical devices are being rolled out in Europe. Further, a new study from consultancy Ramboll shows PVC is irreplaceable in many important applications, among them medical devices.

- **A description of how the European PVC industry has changed since the 1990s.** Among these changes are substitution of harmful additives, greatly increased recycling, dramatic reductions of dioxin emissions, and a recent breakthrough in waste treatment technology, which turns hazardous residues from incineration into safe products.

- **Concrete examples of reuse and sustainable awareness projects in and outside Europe initiated by the PVC industry.** As environmental matters in essence are global it is important that the rest of the world are informed of the progress made in the EU. A partnership between the European PVC industry's voluntary commitment to sustainable development VinylPlus® and the Danish Environmental Agency takes on the challenge of substituting unwanted additives by initiating a dialogue with Chinese industry. Further, to increase plastic reuse and local food production, VinylPlus is financing urban farming with upcycled rigid PVC waste. The project has run since 2015 in Denmark and will be expanded to Rwanda in 2022 in collaboration with two local NGOs.

We hope you will find our PVC update both interesting and useful.

Ole Grøndahl Hansen & Tobias Johnsen,
PVCMed Alliance, 2022

CONTENTS

PVC'S ROLE IN HEALTHCARE – TODAY AND IN THE COMING YEARS

Plastics-based medical devices are essential for safe and efficient patient treatment and care in hospitals around the globe. Many different polymers are used for medical equipment, with PVC in the leading role. The reason for PVC's dominance is the material's unique properties such as safety, versatility, chemical stability, transparency, biocompatibility and not least affordability. Nearly 30% of all plastics-based devices are made of PVC and this share is expected to remain the same in the next decade.[1]

Besides being the most used polymer for life-saving medical equipment such as blood bags, oxygen masks and tubing, PVC is also the main plastic in building & construction. Around 70% of the 5.5 million tonnes of the PVC that is produced annually in Europe goes into durable and recyclable pipes, windows, flooring, roofing, cables etc.

During the last two decades the production, use and waste management of PVC in Europe have undergone a significant transformation. Through VinylPlus, the European PVC industry's commitment to sustainable development, problematic additives have been substituted, recycling systems have been set up and emissions from raw material production are now controlled. In addition, the chlor-alkali industry, from which PVC is produced, has also taken action to reduce its environmental impact.

The NGOs neglect the successful work being done by the European legislators when it comes to environmental regulation related to PVC issues - especially regarding additives and raw material production.

THE NGOS DO NOT ACKNOWLEDGE EUROPEAN PROGRESS

In June 2021 NGO Health Care Without Harm (HCWH) published the paper "The polyvinyl chloride debate: Why PVC remains a problematic material."[2] The target group is EU policymakers, who are urged to develop a strategy for a PVC phase-out in Europe, in healthcare and elsewhere. Major European NGOs have signed and given input to the HCWH document. In November 2021 HCWH published a phase-out list for chemicals of concern, which includes PVC. The list was developed by NGOs in collaboration with hospitals.[3]

As the HCWH paper reflects the general view on PVC by NGOs, we have chosen the document as the reference point for the following critique.

PVCMed Alliance's main concern related to the NGO paper is that it does not acknowledge the above-mentioned sustainable development journey that the European PVC industry has travelled in the last decades. By only focusing sporadically on EU policy and industry, the paper gives the impression that the environmental and health issues related to PVC have not changed at all since the late 1990s when PVC was under heavy attack. By taking this approach the paper neglects the successful work being done by the European legislators when it comes to environmental regulation related to PVC issues - especially regarding additives and raw material production.

GLOBAL SUSTAINABLE DEVELOPMENT STARTS IN THE EU

In principle environmental issues are global, but regulation related to sustainable development very often starts in the EU. The rest of the world eventually has to adjust to European regulation to be able to access the +450 million wealthy consumers in the European Union.[4] Instead of acknowledging and promoting globally the positive development of the EU during the last decades, the NGOs decide to take a scattergun approach by shooting at all potential worst case detrimental effects of PVC and its additives. We believe the so-called 'Brussels Effect' should be used proactively to make the rest of the world follow in the European footsteps.

An example of how industry could help accelerate the Brussels Effect is the recent partnership between VinylPlus and the Danish Ministry of the Environment to engage in dialogue with the biggest PVC-producing country in the world, China.[5] First step in the partnership has been a mapping of the Chinese PVC industry and main exports.[6] Next step will be a seminar where the Chinese industry and authorities will discuss with European experts in toxicology and PVC additive substitution.

VinylPlus® Product Label

To speed up the sustainable use of PVC building products in Europe, the VinylPlus® Product Label has been introduced. The Label ensures that the building products meet eight high sustainability requirements, including PVC resin from sustainable sources, responsible use of additives and controlled loop management. The Label is the first certification scheme for plastic building products to be included in BREEAM and is officially recognised as a label for green public procurement in Belgium alongside FSC, Cradle to Cradle, the Nordic Swan and other well-established eco-labels.

FROM RAW MATERIAL PRODUCTION TO WASTE MANAGEMENT

The HCWH paper looks at the whole life cycle of PVC. Starting with the production of the raw material, it then looks at the different additives which are used to achieve the different performances PVC can provide. Next, the paper evaluates the different waste management options for PVC. Finally, the document looks at alternatives to PVC.

Even though HCWH is an NGO which is involved in sustainable development within the healthcare sector, the PVC paper also deals with the use of PVC in buildings. This makes of course sense because hospitals are buildings, but also because PVC as mentioned is the most used polymer for building and construction products as well as medical devices.

In order to critically review the HCWH PVC paper we follow the same logic, by starting with issues raised in association with raw material production and then address the other topics mentioned in the paper.

We strictly focus on European PVC production, use, recycling and incineration. As the HCWH paper is addressed to the European policymakers, it makes sense to look at the issue solely from a European perspective.

RAW MATERIAL PRODUCTION

According to the NGOs five substances related to the production of PVC raise concern, namely mercury, asbestos, PFAS, VCM and dioxins. All these substances have one thing in common: chlorine. Let us first look at chlorine and then at the mentioned substances of concern:

a. **Chlorine chemistry is the building block of PVC – and a myriad of other essential products**
   According to the NGOs, chlorine is a chemical of concern. It is correct that free chlorine in the form of gas is toxic and has to be handled in accordance with the most recent regulations so that the risks for health and environment are minimised.

   Chlorine is one of the most widely produced chemicals in the world and a building block for a wide range of chemical processes. It is manufactured from common salt, NaCl. In 2019 about 31% of all chlorine was used for the production of PVC. The remaining 69% was used to disinfect drinking water and treat wastewater, in manufacturing of pharmaceuticals – up to 80% of all medicines depend on chlorine chemistry – batteries for hybrid cars, solar panels, wind turbine blades, polyurethane insulation, polycarbonate protective face shields for firefighters, and many other products. It is important to note that many chemicals, plastics and medicines use chlorine, although the end product is chlorine free.

Chlorine chemistry is the building block of PVC – and a myriad of other essential products. Up to 80% of all pharmaceuticals depend on chlorine chemistry.

Caustic soda, which is the other product that is obtained when salt is split into sodium and chlorine, is also crucial for our society. It is for example essential for the production of alumina, pulp and paper, and plays a critical role in water treatment, drinking water purification, cleaning agents, pharmaceuticals, and food processes. Modern society would simply not function without chlorine chemistry, which the NGOs do not acknowledge or choose to ignore.

b. Mercury and asbestos no longer used in European PVC production

According to the NGOs, chlorine production is dependent on mercury and asbestos. In the EU this is no longer true. In Europe, the whole chlor-alkali industry today uses the membrane technology for producing the chlorine needed for manufacturing PVC. The allowed process used to manufacture the chlorine which is subsequently used to produce the PVC is included in the European Commission's legally binding Best Available Techniques (BAT) Reference Document.[7] Being not considered as a BAT, the mercury cell technology can no longer be used in the European chlor-alkali units since 11 December 2017. As a result, European chlor-alkali producers using mercury technology converted or dismantled such facilities. Any resulting mercury-containing wastes were also addressed.[8]

Beyond avoiding using mercury and asbestos, the membrane technology contributes to significant energy savings compared to other technologies. Asbestos and mercury are therefore no longer an issue in European PVC production.

c. PFAS is used in a controlled manner and not traceable in wastewater

To the NGOs, the advances in chlorine production by conversion to membrane technology do not mean PVC production is acceptable. The paper mentions PFAS as new pollutants that would create additional problems.

PFAS is a large family of thousands of different synthetic chemicals.[9] These substances are widely used throughout society and concerns have been raised for their persistence in the environment. A European Parliament resolution of 10 July 2020 urges the Commission to set firm deadlines in the action plan on PFAS so as to ensure the speedy phasing out of all non-essential uses of PFAS, and to accelerate the development of safe and non-persistent alternatives to all uses of PFAS as part of the Chemicals Strategy for Sustainability.[10]

PFAS are used by the manufacturers of important equipment used by the European chlor-alkali industry: membranes, diaphragms, pipework, gaskets, lining of equipment. Although not directly producing or using the PFAS, the European chlor-alkali has proactively conducted tests in collaboration with the equipment supplier to assess the potential release of PFAS in the environment resulting from their operations. Recent tests conducted in Norway have shown no detectable emissions to the wastewater (documentation available upon request).

Many industrial processes, including PVC production, involve hazardous chemicals as intermediates. However, these substances are handled in accordance with the strict European regulations to minimise the risks for environment and health.

Dioxins emissions from PVC production have been nearly eradicated during the last decades. The main sources of dioxin emissions today are from metal, iron and steel production.

d. VCM is an intermediate which does not pose risk in final PVC products

It is true that PVC production involves potentially toxic chemical substances like VCM. However, the NGO document fails to mention that these substances are intermediates and are handled appropriately in a closed system. All residual quantities of VCM in waste streams from the production process are recovered and recycled back into the process.

Studies conducted during the 1970s on workers in PVC polymerisation plants revealed that VCM is a carcinogen, and that significant exposure over a prolonged period can cause cancer. Yet this serious work environment issue was solved almost half a century ago. No workers are in contact with the substance, which is handled in totally closed systems. As early as 1995, the European Council of Vinyl Manufacturers' members signed voluntary charters to ensure environmental releases of VOCs, EDC, VCM, dioxins and hydrochloric acid during handling and production requirements of VCM and PVC. The charters have been regularly updated[11] so as to maintain requirements exceeding those described in the EU BAT reference documents.[12]

VCM concentration in the final PVC resins is specified by the ECVM charters to be below 1 ppm, whatever the final application and production process. As VCM is highly volatile, the VCM concentration after melting and converting the PVC resin into a final article is almost undetectable.

e. Dioxins no longer a PVC issue in Europe

Dioxins are a group of toxic substances, which have never been produced intentionally by industry. They are undesired byproducts of combustion and production processes where chlorine is present. The concerns related to the relationship between dioxins and PVC has been connected to raw material production as well as to waste incineration.[13]

Dioxin emissions from PVC production eliminated

Dioxins emissions from PVC production have been nearly eradicated during the last decades. European PVC resin manufacturers committed already in 1995 to a charter to tightly limit dioxin emissions. Manufacturing is also tightly controlled by Best Available Techniques and EU regulations. It can in this respect be regarded as symptomatic that PVC production is not even mentioned as a specific source to dioxin emission on the German Umweltbundesamt website. The main sources of dioxin emissions today are from metal, iron and steel production.[14] According to the Norwegian Environmental Protection Agency, wood burning in homes is the main source of dioxins today.[15]

PVC waste does not contribute to dioxin formation during incineration

In the NGO paper it is claimed that PVC in the waste results in an increased dioxin formation after incineration. This is contradictory to a conclusion in a report from 2015 published by the Danish Environmental Protection Agency on recycling of rigid PVC. In the report it is stated that since 2003, when regulation on dioxin emissions from incineration plants in the EU came into force, the incineration of PVC waste no longer resulted in increased dioxin emissions.[16]

ADDITIVES

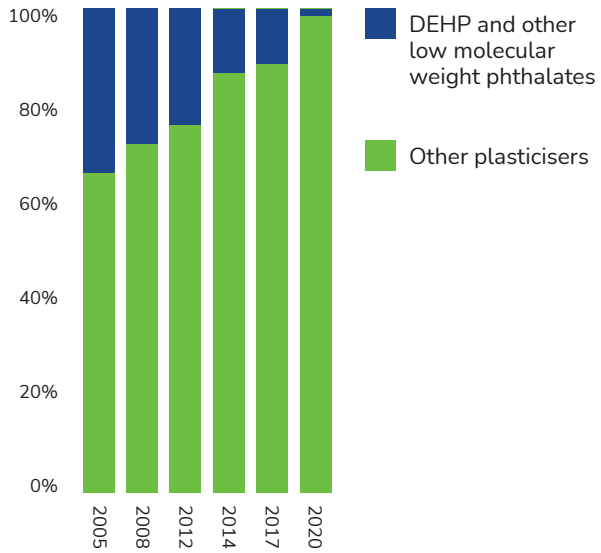
When NGOs call for the elimination of PVC in Europe because of the human exposure to DEHP, the organisations either do not follow regulatory issues or choose to ignore important developments.

a. Almost 100% substitution of DEHP plasticiser in Europe

A large part of the NGO paper is used to describe the harmful effect of the phthalate plasticiser DEHP. Despite the fact that DEHP is still the most used plasticiser in flexible PVC products globally, we do not find it reasonable to highlight the harmfulness of DEHP to an audience who has been working hard to make sure that strict regulation of the use of this substance has been implemented in Europe.

Due to regulation and industry innovation, DEHP and other classified phthalates have been almost 100% substituted in Europe. The substitution has been made possible because of a €6 billion investment by the European plasticiser industry in developing alternatives to DEHP.[17] Four of these are now authorised for medical applications in the European Pharmacopeia.[18] Due to the updated Pharmacopeia, the new justification requirements in the EU Medical Device Regulation and the inclusion of DEHP in Annex XIV of REACH as a Substance of Very High Concern for the environment, we can expect a speedy substitution of DEHP in medical devices.[19]

Substitution of DEHP in Europe



DEHP is still used in some limited applications (e.g. blood bags) in which no suitable alternatives have been found so far despite promising results obtained with substitutes.[20] The blood transfusion industry is working hard to replace DEHP in blood bags.

When NGOs calls for the elimination of PVC in Europe because of the human exposure to DEHP, the organisations either do not follow regulatory issues or choose to ignore important developments.

b. Lead stabilisers voluntarily replaced in the EU

In 2015, a voluntary replacement of lead-based stabilisers was completed by the PVC industry in the European Union. A ban on lead as a stabiliser in PVC is expected to come into force in the EU in the very near future. In contradiction to the way NGOs describe the DEHP issue, the paper is actually acknowledging the successful substitution of lead stabilisers in PVC. However, the NGOs criticise the EU policymakers to be too slow to regulate lead, and industry to be too slow to phase it out.

Recycling of lead-containing PVC is currently being discussed in the EU. According to ECHA recycling in applications such as middle-layer in three-layer sewer pipes or window frames is preferable to incineration or landfilling.[21] The NGOs are against recycling of lead-containing PVC; however they do not propose any sustainable solution on handling such wastes.

The NGOs also fail to mention that lead is still crucial to a wide range of products that are essential to modern society. For instance, radiation therapy for cancer treatment and renewable energy production like solar panels use lead. Recycling of lead is also taking place. Recycled lead is used in car batteries and in listed buildings to mention a few applications.

PVC PIPES DO NOT CAUSE BENZENE EMISSIONS

The NGOs claim that PVC pipes in municipal water and sewer infrastructure cause benzene emissions when exposed to high temperatures in the context of wildfires. This is incorrect.

As recalled in the NGO paper, forest fires devastated the California municipalities of Santa Rosa and Paradise in 2017 and 2018. A study of Santa Rosa's municipal water system has showed that benzene has been detected in their drinking water.[22] The NGOs refer to some media reports which incorrectly suggested that PVC water mains were the source of the benzene. This is not possible since both communities confirmed that no PVC water transmission or distribution mains were affected by the fires and remained in service throughout the events. Both utilities have kept PVC pipe in their specifications and continue to use it. According to Kevin Phillips, District Manager of Paradise Irrigation District, Paradise's PVC pipelines "performed not only during the fire but after they were depressurized and then refilled." PVC water mains are used by the U.S. National Forest Service for its underground infrastructure in forested regions across the country – areas which are regularly affected by wildfires.

The primary source of benzene in forest fires is from the combustion of wood.[23] Burning homes and other structures are secondary sources. Benzene cannot be produced from PVC combustion in an open-air fire. Some reports suggest trace amounts of benzene can be released in a process known as pyrolysis, when it is heated above 350°C in a highly controlled environment in which air is completely absent.[24] However, pyrolysis of buried PVC water mains does not occur during wildfires. For these additional reasons, PVC water pipes could not have released the benzene found in the drinking water in these communities.

The most likely source of benzene in municipal water systems after a wildfire is not from burning or melting water mains but from outside contaminants entering the system via damaged service lines. When a building burns, the service lines that connect to the water mains break, burn and melt, creating gaps where contaminants can enter into the water system. As water in the system is used to fight the fire, suction draws in contaminants. This process is called backflow[25] and can occur regardless of pipe material. It has also been suggested that benzene can permeate through PVC pipes after accumulating in the soil following wildfires. However, published studies[26] confirm that gasketed PVC pipe is highly resistant to permeation from a wide range of chemicals, including benzene.

Several EN 15804-, ISO 14040- and ISO 14044-compliant comparative LCA studies[27] undertaken by the Flemish Institute for Technological Research (VITO) and critically reviewed by the Austrian sustainability consultancy Denkstatt, have confirmed that, for most of the environmental impact criteria, PVC pipe systems have a lower environmental impact when compared to the alternative pipe materials assessed.

Several independent life cycle cost analyses[28] have also demonstrated the cost benefits of using PVC pipes instead of other materials for water and sewer pipes. Selecting PVC instead of other materials allows significant cost savings at all stages of the infrastructure life cycle.

NEW TECHNOLOGY TURNS HAZARDOUS RESIDUES INTO SAFE PRODUCTS

HaloSep offers a groundbreaking solution to manage residues from incineration. The process recovers salt and metals and generates non-hazardous ash to be used in concrete production.

According to HCWH, PVC incineration remains a serious problem because of hazardous residues.

The culprit is chlorine, which as mentioned is the building block of PVC. Chlorine-containing waste has many sources, e.g. salt-containing food waste and wood. It has been reported by the Danish Environmental Protection Agency that PVC waste is responsible for around 5% of these residues. Today the fly ash from the Nordic countries is mainly stored safely on the Norwegian island Langøya or in abandoned German salt mines. In the rest of Europe the fly ash is also deposited safely.

The good news is that this environmental challenge can now be solved. The solution is the so-called HaloSep[29] process which has been developed in Denmark during the last decades. During the last five years the project has been financially supported by the EU Life Programme with €2.2 million. In the beginning the project was also partly financed by VinylPlus. At the moment a full scale demonstration plant has been built in an existing incineration plant near Copenhagen.

HaloSep offers a groundbreaking solution to manage residues from incineration. The end products are metals for reuse in new products, salt for de-icing purposes and non-hazardous ash to be used in concrete production. HaloSep is an on-plant solution that can be built up locally at existing waste-to-energy plants. It can also be placed at a site where fly ash from several smaller plants is consolidated. Thereby, HaloSep will eliminate both cost and emissions related to long-range transportation.

It must be stressed that according to the EU waste hierarchy incineration of waste is not a preferred waste management option. Reducing, reusing and recycling are better options than incineration. Only when PVC waste cannot be reused or recycled should incineration with energy recovery be preferred, ideally with the aforementioned HaloSep solution in combination with carbon capture technology in place.

REUSED PVC WASTE ENABLES LOCAL FOOD PRODUCTION

Talking about the waste hierarchy, reuse of PVC waste is actually taking place. For instance, practical and durable bags made of old flexible PVC truck tarpaulins and advertising banners are modern fashion.

When it comes to rigid PVC waste, innovative DIY'ers have for many years reused PVC pipes and gutters for urban gardening and agriculture. A VinylPlus-supported project in Denmark combines these creative ideas with expert know-how and financial support.[30] The objective is to reuse PVC installation waste from the building industry to build gardens in urban areas.

The idea is to prolong the life of the waste by transforming the waste into useful plant containers. After their service life in urban farming the pipes can be recycled. In addition, the project wishes to encourage local communities to adopt a very cheap solution to build gardens and grow healthy food. Project partners include architects, grassroots, universities, local authorities and the PVC industry.

The project won a reward from the EU-financed Climate-KIC and has won a special prize at the Inovyn Awards, a global competition celebrating the best, new, vinyl-based innovations worldwide.

In 2022 the VinylPlus-funded project will expand to Rwanda, a country with a long tradition for urban agriculture.[31] In collaboration with two local NGOs[32] it will be investigated if reuse of PVC building waste could be a sustainable solution for food production in a developing country. Only local rigid PVC installation waste will be used. As the building sector in Rwanda is growing rapidly there will be plenty of suitable waste.

According to the UN's Food and Agriculture Organization, the rapid urbanisation around the world necessitates that cities become more self-sustaining with local food production. Also in the European Commission's flagship project New European Bauhaus sustainable cities all have local food production as an important element.[33] Free, light-weight and durable plant containers in reused PVC can be a sustainable solution to this development.

> *"Reusing PVC construction products for agricultural purposes is a promising way to 'slow the flow', which is one of the critical steps in the direction of the circular economy."*
>
> *Daina Romeo, PhD student, Aarhus University*

PVC CAN BE MECHANICALLY RECYCLED AGAIN AND AGAIN

The NGOs surprisingly claim *"PVC is the ... least recyclable of all plastics."*

As PVC belongs to the thermoplastic family of polymers, the statement is simply nonsense. In contrast to thermosets, which are the other big family of polymers, PVC and other thermoplastics can be melted for reshaping.

In fact, PVC can be recycled repeatedly depending on the application without losing its technical properties. This is possible because the recycling process does not measurably decrease the chain length of PVC molecules. The material's unique recyclability has been proven by tests performed on PVC pipes, which found that the pipes could be recycled several times without adding new raw material.[34] In a recent book on materials for architects and builders by an independent expert it is even stated that PVC can be recycled at least ten times.[35]

These facts contradict the statements in the NGO paper which claims that *"most plastics can only be recycled once or twice..."* and *"when the plastic is recycled more than two or three times, its quality becomes so poor that it is no longer usable."*

PVC can be recycled repeatedly depending on the application without losing its technical properties. This is possible because the recycling process does not measurably decrease the chain length of PVC molecules.

MORE AND MORE PVC WASTE IS BEING RECYCLED

PVC is not only well suited for recycling – it is increasingly being recycled. In 2020, more than 730,000 tonnes of PVC waste were recycled in the EU through VinylPlus. Since 2000 more than 6.5 million tonnes have been recycled, which saved the emission of about 13 million tonnes of CO_2.[36]

The NGOs also do not seem to be aware that successful projects in Australia, New Zealand, the UK and other countries show a great potential to collect PVC medical devices and recycle them into useful products. In 2021 the collaborative partnership VinylPlus® Med was launched to help hospitals sort their PVC waste stream. The partnership brings together hospitals, waste management companies, recyclers and the PVC industry. Starting with a pilot in Belgium, VinylPlus Med will later be rolled out in other countries in continental Europe.[37]

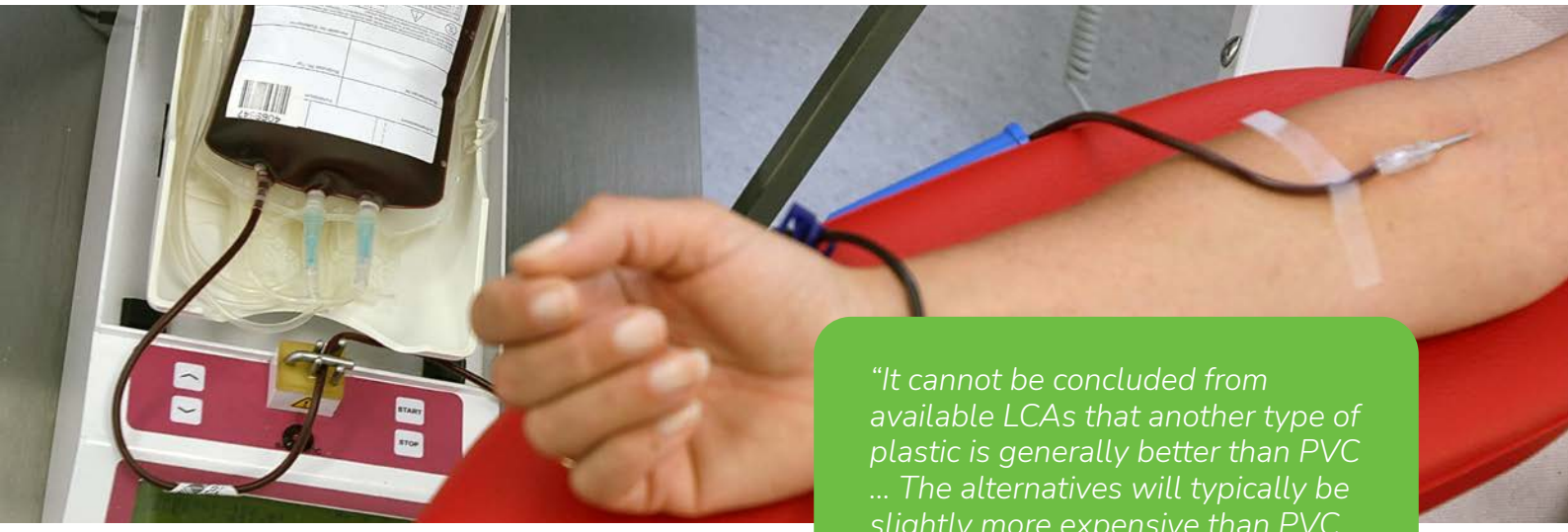
The claim that PVC is unrecyclable is also contradicted in a recent report by Ramboll Denmark, published by the Danish EPA. The report finds that due to the replacement of classified phthalates, recycling of PVC medical devices is now possible.[38]

> *"As the EU market increasingly has moved away from the use of the most problematic phthalates, the possibility of collecting, sorting and recycling flexible PVC arises."*
>
> *Danish EPA, 2021*

Hospitals save money by diverting waste from expensive treatment processes for clinical waste and at the same time contribute to the circular economy, reduce carbon emissions and help save energy. The collection and recycling are done without risk to hospital staff, patients or recyclers as the collection is limited to PVC medical devices which have only been used on pre-screened patients and have not been in contact with bodily fluids or medicines. This practice can be likened to collection schemes for deposit bottles.

A prerequisite for successful plastics recycling is mono-streams. As most PVC-based medical devices are made from only one polymer, they are ideal for recycling. Non-PVC medical devices are often made from a combination of different polymers with multiple additives, which makes recycling impossible with current technologies.[39]

RAMBOLL: PVC IS IRREPLACEABLE IN MANY IMPORTANT APPLICATIONS



> *"It cannot be concluded from available LCAs that another type of plastic is generally better than PVC ... The alternatives will typically be slightly more expensive than PVC and/or have technical properties minor to PVC."*
>
> *Danish EPA, 2018*

"PVC can be replaced with safer materials in virtually all cases," the NGO paper claims.

This is simply not true. In 2020 PVC Information Council Denmark commissioned Ramboll Denmark to map the use and recycling potential of flexible PVC applications (Ramboll is also conducting the study "PVC in the context of a non-toxic environment" for DG Environment, which is expected to be published in 2022).

In the report titled "Circular Visions for Flexible PVC" it is concluded that it will be very difficult to produce similar goods without the use of flexible PVC. By "similar goods" the study refers to a wide range of flexible PVC products like vinyl flooring, roofing membranes, tarpaulins for trucks, trains and tents, advertising banners or cultural event streamers, flood protection equipment, bouncy castles, sports equipment and medical devices. Ramboll finds that:

"The hallmarks of flexible PVC render it suitable in these particular products for a number of reasons including wear resistance, weather resistance, service life, safety and other very specific characteristics."[40]

In the context of circular economy the report says:

"Flexible PVC has a long service life. In the context of the circular economy and optimal sustainability, where flexible PVC products are made recyclable, trade users could achieve significant resource savings since flexible PVC production would have recourse to recyclate as an alternative to using virgin materials."[41]

The NGO paper also has the premise that replacement of PVC by alternative materials is preferable, without providing any documentation to substantiate the claim. It is highly doubtful if non-PVC products in general are better for health and environment. In a 2018 report by the Danish EPA it cannot be concluded from life cycle analyses that PVC-free products always are preferable to PVC. ... *"The alternatives will typically be slightly more expensive than PVC and/or have technical properties minor to PVC."*[42]

Photo: Kristof Lemp.

INDUSTRY INVOLVEMENT ESSENTIAL IN NEW EUROPEAN BAUHAUS

In the coming years, PVC's unique combination of durability, versatility, recyclability and affordability will be needed. Take for instance the European Commission's recently launched New European Bauhaus, which chairman of the EU Commission Ursula von der Leyen describes as being the very spirit of the EU's large-scale Green Deal. Inspired by the legendary Bauhaus School, the European Commission wants to build a sustainable, beautiful and inclusive Europe. Being a durable, recyclable, affordable and versatile material, we believe PVC has a role to play in the New European Bauhaus. In the hands of architects and designers, the material can even contribute to beautiful creations.

For the original Bauhaus movement, industry involvement was a precondition for the development of a new, better society for all. Following in the footsteps of the original Bauhaus, we are convinced that a sustainable, beautiful and inclusive Europe cannot be developed without industrial know-how, innovation and production. The PVC industry is ready to contribute.

CONCLUSION

Our critical review of the NGO paper has hopefully demonstrated that it does not contribute to an informed discussion on PVC in Europe. Yet we do not claim that the PVC material is “green” or sustainable today. The European PVC industry began its sustainable development journey two decades ago, and there is still a long way to go. In 2021 VinylPlus launched its programme for the the coming decade, in which the next step of this journey is outlined.[43]

The PVC value chain is one of few industries to have joined forces and invested in sustainable development. This effort has been recognised by many stakeholders, among them Christophe Yvetot from the United Nations Industrial Development Organization: “*We see the VinylPlus initiative as the forerunner and role model for a global standard of the industry.*”[44]

The objective of this critique of the NGO paper is not to claim that the role of the NGOs when it comes to PVC should be neglected. We are fully aware that the transformation of the PVC material in part owes to efforts by Greenpeace, who in the 1990s pointed to important issues which authorities in Europe could not ignore. Consequently, regulation and industry innovation and investment started the sustainable development journey for PVC. What must be stressed in this narrative is the well-grounded scientific approach by Greenpeace at the time. Unfortunately, as we have shown, we do not see the same scientific rigour in the present paper, which has been signed by a wide range of European NGOs. We therefore urge the European policymakers and hospitals, who are the target audience, to disregard the document as a basis for PVC phase-out initatives. Instead, we call for support for circular healthcare initiatives for PVC, which is both the most used plastic for medical devices and easily recyclable.

ENDNOTES

1 Europe Medical Polymer Market Report, Global Market Insights, 2021

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ABOUT PVCMED ALLIANCE:

PVCMed Alliance is The European Council of Vinyl Manufacturers' value chain platform to raise awareness and promote informed decisions about the use of PVC in healthcare. The Alliance was established in 2012. The vision that informs PVCMed Alliance's work is of a healthcare environment that best benefits patients and healthcare professionals. Such an environment offers the finest PVC-based products and applications with the required properties and excellence needed to provide top quality health care while being environmentally sustainable.

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