Sustainable Construction Product

QUALITY WINDOWS

made of PVC

5

good Reasons

VinylPlus® Programme
Environmental Impacts
RAL Quality Assurance
Design-for-Recycling
PVC Window Recycling

5 Reasons for a Sustainable Construction Product

CONTENT

Picture: © VEKA | veka.de

Picture: © GKFP | gkfp.de

Picture: © Internorm International | internorm.com

Photo: © iStock.com/hrabar

Picture: © Rewindo | rewindo.de

DEAR READERS,

Manufacturers wanting to label their products as sustainable must first get in the habit of investing in the sustainable development of raw materials, production processes, logistics, and product design. No pain, no gain!

Production processes that preserve resources are standard practice for plastics fabricators. PVC windows, for example, have been recycled and reused for new window profiles for the past 25 years in order to save raw materials and energy. Recycling processes are the technologies of the future and considering the fact that windows typically have a service life of 35 years, it is essential to start developing future recycling processes today already. Durability, usability, and energy efficiency are distinguishing features of PVC windows that are thus also core elements in RAL quality assurance in use since 1979. In summary, this makes modern resource saving processes, recycling, and quality assurance visionary and sustainable industrial policies for PVC windows as a construction product.

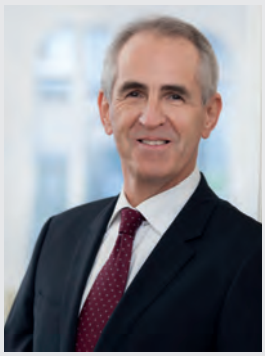
With VinylPlus, the European PVC industry laid the foundation for its own sustainability programme in 2001. It placed emphasis on exchanging and replacing stabilizers that contain heavy metals as well as the establishment of a recycling concept for Europe. Approximately 5 million tons of PVC products have been recycled and transformed into new products to date. At times, PVC Profiles can contain up to 44% of recycled materials, PVC window profiles are instrumental in this success.

Sustainable business practices will never become outdated, because it is essential to constantly rebalance political, economic, and ecological actions to take into account the needs of future generations. This costs money and entails a lot of rethinking, which can require the alteration of current practice. However, it also offers the opportunity to develop new ideas and business models. Sustainable development is ultimately worth the effort and has the potential to be transformed from a concept into a success strategy.[1]

Here, we would like to present to you the five reasons for sustainable PVC windows.

RAL Gütegemeinschaft
Kunststoff-Fensterprofilsysteme e.V.

Gerald Feigenbutz |
Managing Director



[1]Arnd Hardke / Marco Prehn, Perspectives of sustainability – from mission statement to success strategy, Gabler Verlag 2001

Find out more about the VinylPlus Sustainability Programme online: vinylplus.eu

#1 Sustainability Programme VinylPlus

Picture: © VinylPlus Progress Report 2019 | vinylplus.eu

Picture: © Finstral | finstral.com

FIRST SUSTAINABILITY MARK FOR PVC WINDOWS

With the sustainability programme Vinyl2010 and VinylPlus® launched in 2010, the European PVC industry set a standard that the system houses operate by. The newly introduced VinylPlus® product label for PVC windows is representative of this.

Both programmes were borne of an open dialogue between industry, consumers, NGOs, and politics maintained as a voluntary commitment. The approximately 100 million EUR that have been invested in the programme thus far are a testament to the determination with which the companies involved have approached the matter. Funds have been used to develop and implement the recycling concept, particularly through technical projects.

Another focus of the programme was the exchange and replacement of stabilizers containing heavy metals, which was completed in 2015 as planned.

Here the programme supports first and foremost sustainable acquisition and responsible handling of additives and auxiliary materials. In addition to virgin materials, VinylPlus partners also work with recycled PVC (recyclate). For window profiles, for example, a special production process called coextrusion is used to extrude recycled materials in the core of the profile. This technique is increasingly being used to produce very high-quality window profiles, giving rise to a symbiosis between ecological and economic objectives.

With the product label, a mark is also available that brings together the requirements of the sustainability programme in a single graphic symbol. It essentially represents the sustainable procurement of (raw) materials and was issued for the first time for PVC window profile systems. Together with the RAL quality mark, this introduces a symbol to the market that signifies a sustainable production process, high durability, a high percentage of recycled materials used in the end product, as well as strict quality and resource management. The concept is based on BES 6001, a programme of the Building Research Establishment (BRE) for sustainable acquisition, which has been expanded here to include PVC-specific requirements. Compliance must be demonstrated in a third-party audit.

These are the criteria companies must fulfil in order to use the VinylPlus® product label:

- Be a partner of VinylPlus
- Have established management systems
- Meet specific logistics requirements
- Engage in consistent recycling of used PVC windows (controlled loop)
- Obtain PVC from sustainable production
- Use additives responsibly
- Reduce energy and resource consumption
- Get employees, customers, and consumers excited about sustainability

Picture: © iStock.com/lionvision

Picture: © Thomas L. Fischer; with friendly permission of Baerlocher | baerlocher.com

USE ADDITIVES SUSTAINABLY

Additives are vital for both processing plastics as well as for product design. They stabilise the material, facilitate production and give the end product specific mechanical properties. As for all substances, additives are being continually developed further to satisfy the current requirements.

One example of the continuous further development of plastic additives are calcium-zinc compounds, which have replaced the stabilisers containing lead and cadmium used previously. The latter are no longer used today, but may be present in recycled PVC.

This also applies to old windows that are recycled, these substances – also called legacy additives – will re-circulated in new products. However, they are firmly incorporated in the plastic matrix and are not bioavailable according to scientific studies.[1]

The above is sometimes used as an argument against post-consumer recycling. Proponents of recycling however reply that controlled use[2] (controlled-loop system) is a more sustainable solution and therefore believe in consistent recycling of plastic.

Other additives such as chalk, titanium dioxide and coloured pigments are used as fillers or are used to give colour and light fastness.

ASSESSMENT CRITERIA: ADDITIVE SUSTAINABLE FOOTPRINT

Additives are used in a much targeted manner to ensure sustainable use. It was necessary to develop a recognised standard to achieve this. The VinylPlus® Additives Working Group is focussing on this task and has commissioned The Natural Step (TNS), a specialist sustainability NGO, to develop an Additive Sustainable Footprint (ASF). It is based on information concerning the life cycle (life cycle assessment) and a defined system conditions relevant to (social) sustainability. Taking a contrasting approach, the elements that disrupt the sustainable system are to be included in the assessment.

TNS SUSTAINABILITY PRINCIPLES

TNS has formulated the following sustainability principles on the basis of the system conditions:

- No enrichment of natural resources in the biosphere
- No enrichment of products in nature
- No harm to the environment through physical intervention
- No adverse effects on humans or health, competence, influence and opinion-making

The first ASF was created in 2017 for PVC window profiles and incorporated into the VinylPlus® product label as a central requirement.

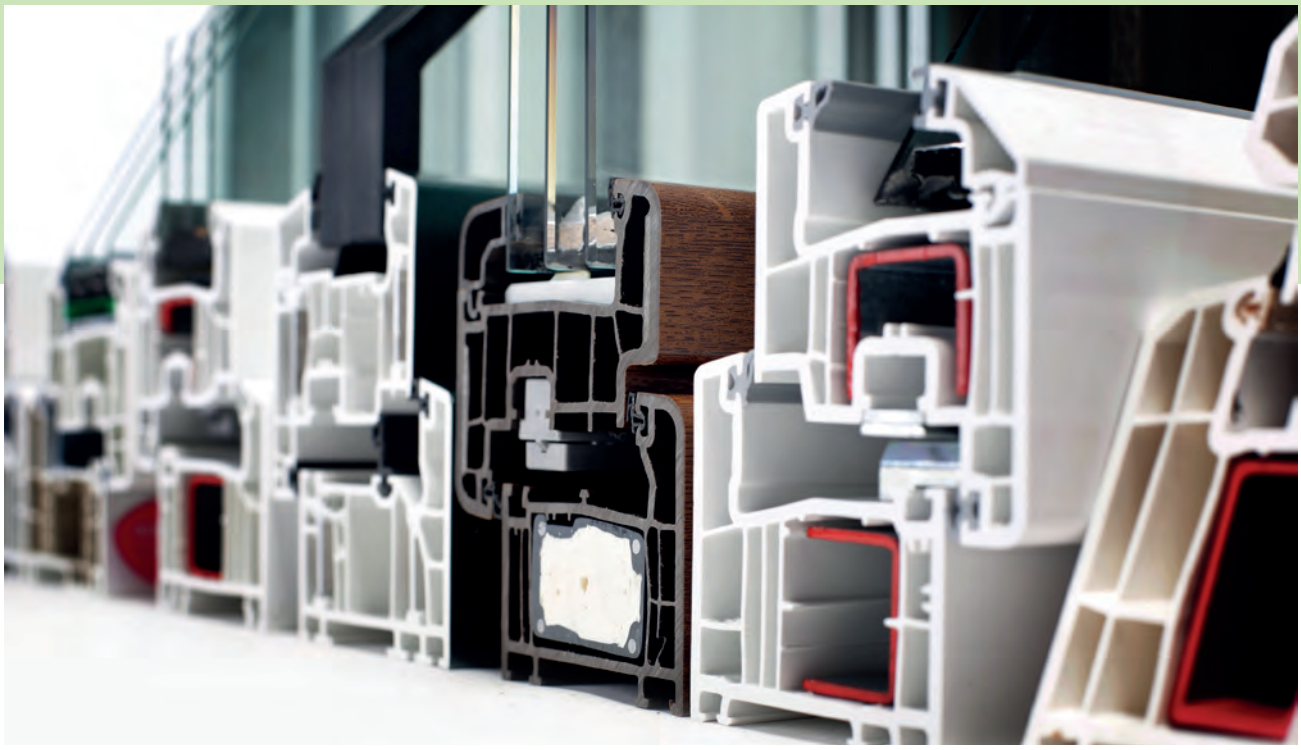
[1] VinylPlus Progress Report 2019, p. 10 | [2] The Natural Step (February 2018). Legacy additives in rigid PVC and progress towards sustainability), p. 4

Environmental Product Declarations are available online at: ibu-epd.com

#2

Power Requirements, CO_2 Footprint + Environmental Impact

Picture: © iStock.com/hrabar



Picture: © GKFP | gkfp.de

ENVIRONMENTAL PRODUCT DECLARATION: ALL FACTS AT A GLANCE

System manufacturers have verifiably reduced their energy consumption by implementing manufacturing processes and energy plans that use resources sparingly, thus decreasing their CO_2 footprint. The results are regularly published in standardized environmental product declarations pursuant to EN 15804, which contain information on the environmental effects of individual construction products.

In addition to acquisition, production technology has become the second most important area for recommendations on sustainable action. Energy plans and modern product design facilitate the establishment of lean processes and make it possible to implement material-optimized product solutions. A study of PVC fabricators revealed that primary energy usage decreased by 9.6% during the period from 2007 to 2017. Some companies have even succeeded in reducing their usage by up to 20%.

Quality and environmental management systems that ensure the standardization of achieved successes ultimately make a further contribution to sustainable economies. European system houses prepare a balance of their average energy consumption for renewable and non-renewable energy in environmental product declarations. The same applies for standardized environmental effects such as greenhouse gas potential, over-fertilization, potential for ozone depletion, etc.

Updated periodically every five years, declarations thus also become a record of progress issued by the Institut für Bauen und Umwelt (IBU), which runs the programme.

Picture: German Version of EPD © GKFP | gkfp.de

Learn more about RAL Quality Assurance online: ral-guetezeichen.de/en

#3

RAL Quality Assurance

Picture: © CATAS | catas.com

Picture: © GKFP | gkfp.de

USABILITY – HEALTHY LIVING – ENVIRONMENTAL SAFETY

System manufacturers across Europe have been putting quality marks on their PVC window systems for over 50 years, making it a prerequisite for many years of functionality and usability.

PVC window systems are quality controlled by international quality assurance systems such as KOMO (NL), NF and QB (FR), ATG (BE), and RAL (DE), to name just a few. It must have numerous quality-defining features and be monitored regularly by independent inspection agencies. Requirements pertain to materials used and mechanical properties and these requirements are usually applied above and beyond those for product standards.

In addition to profile systems, the quality mark is also applied for insulating glass, fittings, the window, and the assembly, an integrated concept that creates the conditions for longevity and extended product usability.

EXPANSION OF THE QUALITY MARK (GÜTEZEICHEN)

Builders and consumers are increasingly using the product's impact on the indoor climate and the environment as selling points. The two characteristics of "healthy living" and "environmental safety" are therefore being added to the RAL quality mark and are expected to soon become established across Europe as a quality mark that guarantees these characteristics listed as well.

HEALTHY LIVING AND ENVIRONMENTAL SAFETY

First and foremost, healthy living means keeping harmful substances out of the indoor environment. The German Institute for Construction Technology or DIBt specifies that the evaluation scheme of the Committee for Health-related Evaluation of Building Products (AgBB) must be used. PVC windows with the quality mark meet these requirements, as our environmental product declarations make clear, see page 9. In the future, expansion of the quality mark with these two new characteristics will ensure that PVC windows with the quality mark are monitored for environmental safety throughout the entire life cycle, from manufacturing through to disposal (cradle to grave). The consumer can therefore rest assured that PVC windows carrying the quality mark have been monitored for environmental safety throughout the entire life cycle.

FOUR QUALITY ASSOCIATIONS FOR SAFE AND SUSTAINABLE PVC WINDOWS

Four quality associations are involved in a certified RAL PVC window: For example, the PVC window profile systems quality association checks the suitability of the window system and its components. The insulating glass used in the completed window is monitored for quality by the Flat glass quality association and coatings by the Locks and hardware quality association. The quality assurance of the PVC window as an end-product including installation comes under the Windows, façades and doors quality association.

Picture: © Internorm International | internorm.com

Picture: © profine | profine-group.com

DESIGN-FOR-RECYCLING: GETTING READY FOR TOMORROW, TODAY

Design-for-Recycling is a method to make products more environmentally sound. It takes account of the impact on the environment and human health along the entire life cycle. Its implementation therefore means manufacturing processes that conserve resources, long periods of use as well as a meaningful recycling concept. PVC windows are a good example of this.

Design-for-Recycling is important in material and product development, because this lays the foundations for products and processes which conserve resources. When looking at the entire life cycle of a product, the recycling scenarios of tomorrow already have to be considered during the development phase. This represents a not inconsiderable challenge for PVC windows. Windows, which are installed today, will only be dismantled in 30 to 40 years' time. The life cycles are therefore very long and no one knows whether and how the requirements might change in the meantime.

EXAMPLE OF HYBRID MATERIALS

PVC window systems are reinforced with a steel profile so they can bear the heavy weights of the insulating glass, depending on the latter's size and design. It's well known that window profiles without a steel reinforcement can have better thermal characteristics. In order to reduce heat loss, hybrid materials have been developed successfully, replacing these steel reinforcements. But can they also be recycled? The system houses had taken on this issue and hope to find the answers to this question in a research project. The results of the study give clear recommendations how recyclability of the EoL[1] window can be secured via taking the corresponding steps in the design phase.

DESIGN-FOR-RECYCLING – CRITERIA AND GUIDELINES

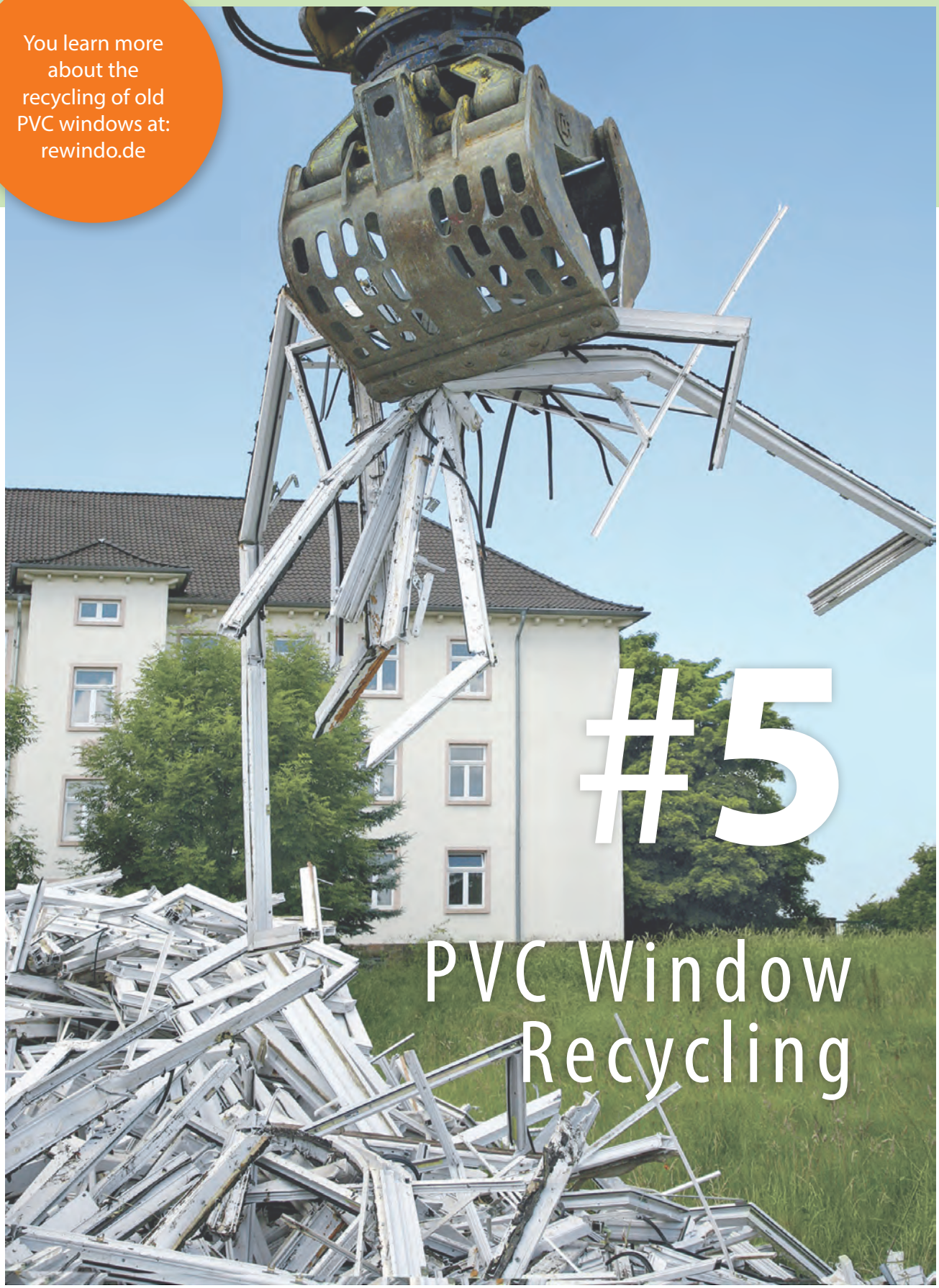
Without doubt, the most important design criterion is whether something can be recycled. This means that materials or their components must be identifiable at their end of life. It's very easy for PVC windows, which are chiefly made of rigid PVC. However, many other forms of plastic waste are rarely recycled when sorted according to material. Therefore, sorting and processing are an important condition for a good recycled material. Furthermore, the product must be decomposable, regardless of whether it is to be recycled mechanically or chemically. The recycled material and product quality must be coordinated to equip more products than previously with recycled materials. All this must already be considered at the product development stage.

YES TO "RE-USABLE GOODS"

A driving force is necessary so that circular processes remain in full swing. Right at the top is acceptance by planners and builders to choose building products containing recycled materials. If the legislators, municipalities and disposal companies ensure that the materials in old windows are, in line with the waste hierarchy, mechanically recycled, then recyclers can expect to receive sufficient materials to supply the market with recycled materials.

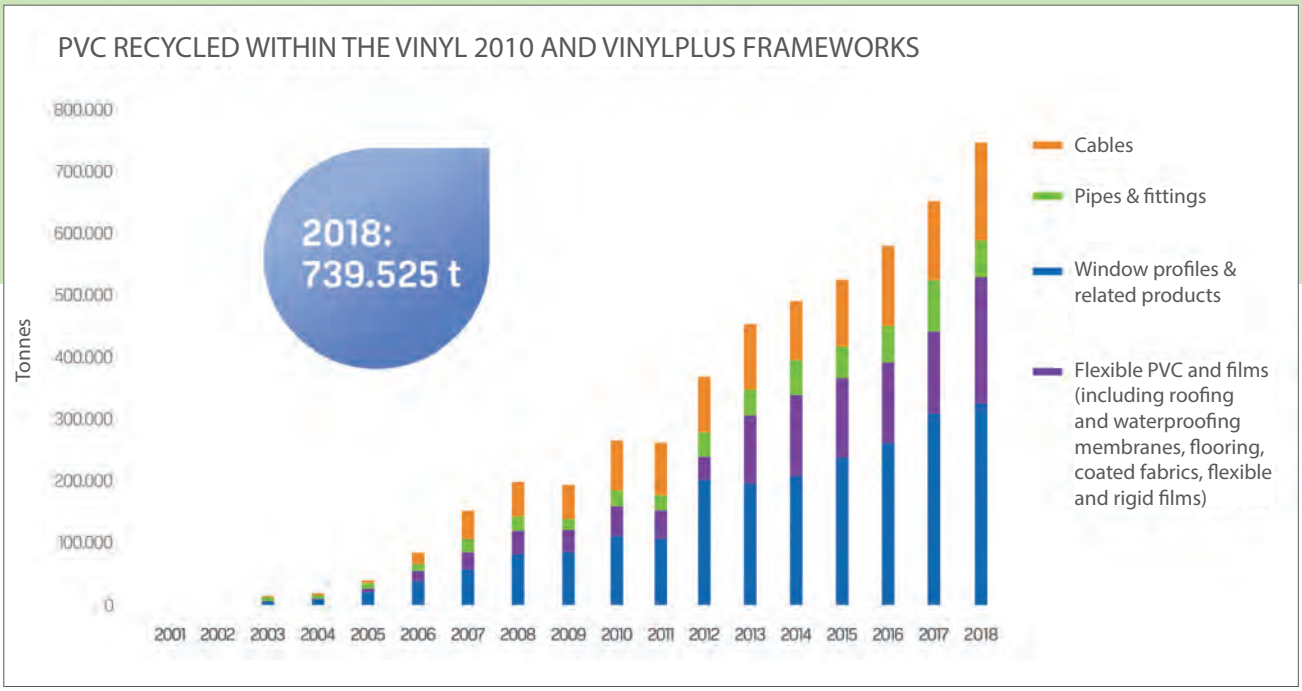
[1] End-of-Life

You learn more about the recycling of old PVC windows at: rewindo.de



#5 PVC Window Recycling

Picture: © Rewindo | rewindo.de



Picture: © VinylPlus Progress Report 2019 | vinylplus.eu

CIRCULAR ECONOMY – MAKING SOMETHING NEW OUT OF SOMETHING OLD

Flagship project for plastics and the circular economy.

In the current "plastics" debate, the established process of controlled-loop recycling has been regarded as an example of best practices. In 2018, approximately 326,000 tons of old PVC windows were recycled and reused to manufacture high-quality construction products such as windows, pipes, and other products, according to the VinylPlus® progress report for 2019.

A good example showing that maintaining circularity can work and is economically feasible. Experts have collected experience in a European standard, in order to standardize the quality of PVC recycled materials for PVC window profiles. This entire life cycle of the window (prEN 17410), the profile (EN 12608-1), and the product standard (EN 14351-1) complete the assortment of European product norms for PVC windows.

GOOD REASONS TO RECYCLE

Case studies from the Gütegemeinschaft Kunststoff-Fensterprofilsysteme show that a PVC window profile can be recycled multiple times without degrading quality. Using recycled materials saves valuable raw materials and reduces energy consumption for raw material and profile production, thus decreasing emissions of greenhouse gases and other pollutants. Every ton of recycled PVC used saves about 2 tons of CO_2 emissions compared to new PVC.

MANAGING CIRCULATION

Manufacturers have access to modern recycling technology and are familiar with the challenges associated with circularity management. However there is currently not sufficient supply of old PVC windows. Additional collection points and cooperation from window construction companies and builders, who must seek out nearby recycling facilities or collection points after removing PVC windows, are needed in order to increase supply. If you know of plans to replace windows, you can contact the system houses and window construction companies.

CIRCULAR PLASTICS ALLIANCE

The European Union has made moving the transition to the circular economy forward a main priority and is starting by focusing on the production with secondary raw materials from plastic waste.

With the ambitious goal to turn 10 million tons of recycled plastics into new products by 2025, the European Commission founded the Circular Plastics Alliance, an initiative of over 170 international companies and European organizations that have pledged to achieve these goals. Together with VinylPlus, PVC fabricators are working on solutions for building and construction and five other key sectors.

DO YOU HAVE ANY MORE QUESTIONS?

- Please visit us on the internet at **gkfp.de** or send us an e-mail to: **info@gkfp.de**

PUBLISHER

Qualitätsverband Kunststofferzeugnisse e.V. (QKE)
RAL Gütegemeinschaft Kunststoff-Fensterprofilsysteme e.V. (GKFP)
Am Hofgarten 1–2 | 53113 Bonn | +49 228 766 76 54 | info@gkfp.de | gkfp.de | qke-bonn.de

European PVC Window Profile and related Building Products Association (EPPA ivzw)
Avenue de Cortenbergh 71 | 1000 Brussels
+32 27 39 63 81 | info@eppa-profiles.eu | eppa-profiles.eu

Rendering Cover: GKFP and iStock.com/runna10

QUALITÄTSVERBAND KUNSTSTOFFERZEUGNISSE E.V.
FÜR LANGLEBIGE KUNSTSTOFFPRODUKTE

KUNSTSTOFF FENSTERPROFILSYSTEME | RAL GÜTEZEICHEN

EPPA
The European Trade Association of PVC Window System Suppliers