

PVC-U Window Profiles containing Recyclate (rPVC-U)

Factsheet on the use of recyclates in PVC-U window profile systems

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The market acceptance of PVC-U windows continues to grow among planners, architects and specifiers. This is based on the heat-insulating properties and the architectural scope of design that modern PVC-U windows have to offer. Furthermore, PVC windows are long lasting building applications, with an average service life of 40 years, rendering them attractive low maintenance, energy-efficient and environmental products.

1. Increasing the recycling of PVC Profile Waste

Already over 20 years ago the industry took the initiative to build up a recycling site for old PVC-U windows. It was the proclaimed aim to re-use the gained recyclate in new window profiles. Today, recycling systems for old windows exist in Western European countries. PVC profile recycling is a sophisticated process, based on technology developments that focus in particular on treatment of 40 year old post-consumer waste. The European system houses, which we represent as an association, process PVC recyclate from old windows and production waste. In 2020 about 354.000 tons PVC¹ of profile waste have been recycled and partly used for producing new window profiles. This amount has been rising steadily over the last two decades and will continue to raise in the future, as there are still around 650 million PVC windows installed across Europe [Figure 1].

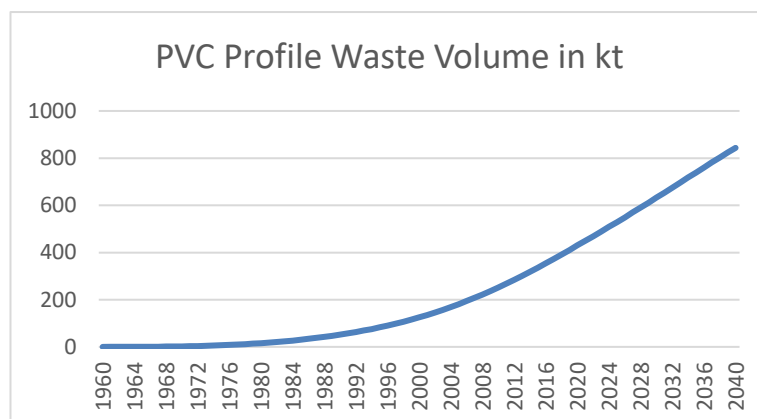


Figure 1: Forecast of available (collected) PVC Profile Waste in EU by, Source: Conversio

Conclusion: The amounts of available profile waste for recycling will increase and EPPA members commit to and strive for recycling every old window that becomes available; and to use the recyclate in the production of new windows & doors.

2. Recyclate content in modern PVC-U windows

The average *maximum* recyclate content in a window profile usually is around 50%. This is determined by the manufacturing process because recyclate is mainly used in the core of the profile. Based on the European standard EN12608 for PVC-U window profiles, the visible surfaces of window profiles must be covered by virgin material. This ensures a high degree of weathering resistance and UV stability. Noting that 50% reflects an average, the European market offers profiles with recyclate content between 0% and 100%. The exact amount of recyclate in a window profile depends on:

¹ VinylPlus Progress Report 2021, retrieved September 2021, from:

[https://vinylplus.eu/uploads/Progress%20Report%202021/VinylPlus%20Progress%20Report%202021_EN_sp%20\(2\).pdf](https://vinylplus.eu/uploads/Progress%20Report%202021/VinylPlus%20Progress%20Report%202021_EN_sp%20(2).pdf)

1. **Technical ability to include recycle into the profile.** The uptake possibilities differ based on profile geometries, tools and techniques used. More information can be found in the EPPA Design for Recycling Guideline.
2. **Market availability of rPVC-U.** The amounts of recycle currently available are not sufficient to include recycle into all new window profiles produced.

Conclusion: The predominant part of modern PVC-U windows (main profiles) in Europe has an average recycle content of 50%.

3. The impact of recycle PVC-U on quality

The quality and the performance of PVC-U window profiles are key warrantors for the longevity and functionality of windows and doors. For decades, the system houses subject profiles and production to renowned quality controls such as the RAL GZ-716 in Germany, the QB 34 in France, KOMO BRL0702 in the Netherlands and ATG in Belgium. In particular the mechanical characteristics but also the type testing of the final windows are controlled as part of these quality certifications. The test reports since 1980 allow for a consistent verification that the recycles used in the core of the profiles are qualitatively equal to virgin material.

Conclusion: Quality controls prove that using recycle does not lead to a lowered quality or performance of the verified characteristics.

4. Mechanical recycling, dangerous substances and sustainability

PVC-U is a long-lasting plastic which can be re-used many times due to its chemical composition and recyclability. Numerous construction products made from PVC-U are being recycled today enabling us to keep the materials in the value chain for a longer time. This is equally true for its components. Mechanical recycling is in line with sustainability criteria² but also keeps under control substances in the value chain that have been phased out by the industry years ago³.

In contrast, incineration would cause an immediate release of most of the contained substance into the air. Landfilling would also result in incineration in the long run.

Furthermore, landfilling and incineration destroy a valuable resource that can be used as a replacement for new sourced virgin material. Accordingly, recycling is beneficial for the environment in two ways: by controlling the risk of legacy additives and by saving valuable resources.

Conclusion: Mechanical recycling of PVC products is a useful and sustainable contribution to climate protection. One ton of PVC recycle saves 2,027 tons of CO₂ compared to the use of virgin material⁴. This is an important contribution to a resource efficient product and production policy.

² Environmental Product Declaration for PVC-U window (1,23 x 1,48 m) with insulated double-glazing (2016), retrieved March 7th, from: <https://epd-online.com/PublishedEpd/Detail/9185>

Environmental Product Declaration for PVC-U window (1,23 x 1,48 m) with insulated triple-glazing (2017), retrieved March 7th, from: <https://epd-online.com/PublishedEpd/Detail/9838>

³ Mercea, P. V., Loshier, C., Petrasch, M. and Toşa, V. (2017), Migration of Stabilizers and Plasticizers from Recycled Polyvinylchloride. J Vinyl Addit Technol. [doi:10.1002/vnl.21609](https://doi.org/10.1002/vnl.21609)

⁴ Based on EPPA EPDs, see footnotes 2 and 3