VINY LOOP

SMART RECYCLING

LOW FOOTPRINT

VINYLOOP: ENVIRONMENTAL SOLUTIONS

VinyLoop® is a recycling technology for difficult-to-treat PVC waste, which produces a virgin-like recycled PVC compound.

VinyLoop® R-PVC lowers the environmental footprint of new products with the guarantee of technical and quality performance.

The smart solution for customers and consumers.

VinyLoop®

Smart Recycling - Low Footprint

> THE WASTE RECOVERY AND RECYCLING PART OF THE WASTE TREATMENT CHAIN PROBABLY HOLDS THE GREATEST POTENTIAL IN TERMS OF CONTRIBUTIONS TO A GREEN ECONOMY.
>
> UNEP, Green Economy Report

Greening the Economy

In its Communication 'A resource-efficient Europe', the EU Commission states that increasing recycling rates will reduce pressure on the demand for primary raw materials, help to reuse valuable materials which would otherwise be wasted, and reduce energy consumption and greenhouse gas emissions from extraction and processing.

Extending the life cycle of products, VinyLoop® recycles PVC from difficult composite materials, gives unused resources a new life, prevents valuable plastics from being landfilled or incinerated, and produces consistent quality, high-level purity recycled PVC compounds (R-PVC), similar to virgin compounds.

The VinyLoop® Eco-Footprint Study, which evaluates the environmental impact of the R-PVC comparing it with virgin PVC compound produced conventionally, shows that VinyLoop® R-PVC has a lower environmental footprint. These significant environmental benefits can be extended to the goods produced by VinyLoop® customers and communicated to the final users.

In terms of resource efficiency, VinyLoop® allows companies with PVC scraps to benefit from a greener alternative for the treatment of their waste, avoiding landfill or incineration. Through recycling, waste becomes a valuable raw material resource.

Following a Life Cycle approach

All products have an environmental impact throughout their entire life, from raw material extraction to manufacturing, distribution, use, repair and maintenance, and disposal or recycling.

The evaluation of the environmental impact of a product has to be developed following standardised schemes. A Life Cycle Assessment (LCA) is a technique to assess environmental impacts associated with all the stages of a product's life from cradle to grave.
LCAs can help:

- Compile an inventory of inputs and environmental releases;
- Evaluate the potential impacts associated with identified inputs and releases;
- Interpret the results to help make a more informed decision.

For its Eco-Footprint Study on R-PVC, VinyLoop® endorses the Life Cycle Assessment approach as the most effective and objective method for product comparisons on a scientific, reliable and sustainable basis.

The methodology used for the VinyLoop® Eco-Footprint Study has been critically reviewed by the independent testing organisation DEKRA Industrial GmbH (www.dekra-certification.com), which confirmed its compliance with the ISO standards 14040-44 for Life Cycle Assessment.

VinyLoop®

The VinyLoop Eco-Footprint

PVC composite waste recycling is challenging due to the complexity of the different materials. The VinyLoop® process, through selective dissolution and filtration, is able to eliminate contaminations and produce a recycled PVC (R-PVC) compound of a quality similar to virgin compound.

The VinyLoop® R-PVC is used for the production of garden and air hoses, geo-membranes, foils (roofing, flooring, waterproofing membranes, pool and pond foils), coated textiles/furniture, mats and plates, shoe soles and boots.

The objective of the Eco-Footprint Study was to assess the environmental impact of the regenerated product, comparing one kilogram of VinyLoop® R-PVC with one kilogram of PVC compound produced conventionally. The conventional route includes the incineration of the PVC waste and the use of virgin PVC compound for a new product.

The Eco-Footprint Study assumes that the VinyLoop® R-PVC can replace the equivalent amount of virgin PVC compound, having the recovered PVC comparable mechanical properties to those of the corresponding virgin material, and therefore, that manufacturing the desired articles requires the same weight quantities of virgin or recycled materials.

The results of the Eco-Footprint Study show that the Primary Energy Demand (PED) of the Vinyloop® R-PVC decreases by 47% compared to virgin PVC compound produced by conventional route; the Global Warming Potential (GWP 100a) is 40% lower and the Water Consumption is reduced by 76%.

Global Warming Potential, Primary Energy Demand and Water Consumption are significant environmental indicators. They express the impact of indicator per Product or Service.

Global Warming Potential (GWP)

is a relative measure of how much heat a greenhouse gas traps into the atmosphere. GWP is calculated and expressed as a factor of carbon dioxide (CO_2), i.e. as CO_2 equivalent.

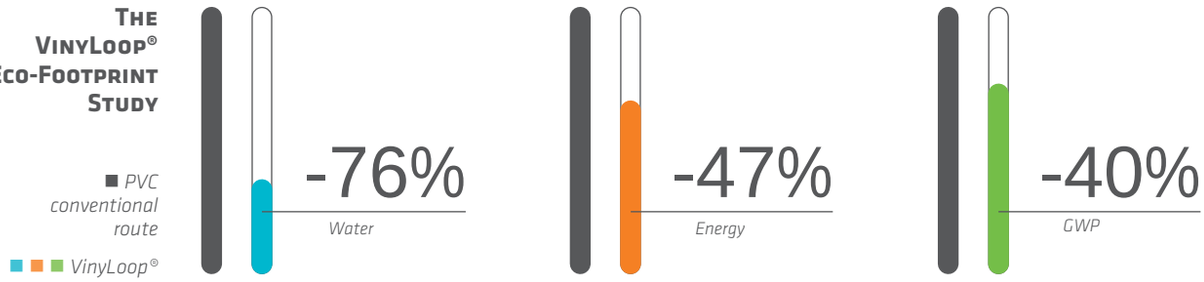
Primary Energy Demand (PED)

is an energy form found in nature that has not been transformed.
It is energy contained in raw fuels, and other forms of energy received as input to a system. Primary energy can be non-renewable or renewable. It is a measure of the resource used across the life cycle of a product. It is characterised by the net calorific value of the product and represents the still usable energy content.

Water Consumption

is the total volume of freshwater consumed by the individual, community or the business. The water footprint is increasingly used as a relevant environmental indicator.

The VinyLoop® Eco-Footprint Study



Together with PED, GWP and Water Consumption, the study also considers all the main impact categories analysed in LCA studies:

- Depletion of abiotic resources: the consumption of non-renewable resources, thereby lowering their availability for future generations. The abiotic depletion indicator is measured in kg of the reference resource antimony (Sb);
- Acidification: the contribution to acid depositions that have negative impacts on natural ecosystems and the man-made environment (acid rain). This parameter is measured in sulphur dioxide equivalent: the most significant gas contributing to acidification;
- Eutrophication: the nutrient enrichment that causes algal bloom in inlets and springs, measured in phosphate (PO_4) equivalent;
- Photochemical oxidation: the release of substances that could provoke chemical reactions brought about by light energy from the sun (smog, ethylene equivalents).

As reported in the table, the benchmarking of the environmental impact of the VinyLoop® R-PVC against PVC compound produced conventionally is favourable for most of the considered impact categories.

IMPACT CATEGORY	PVC CONVENTIONAL ROUTE	VINYLOOP®	UNIT	DIFFERENCE
Global Warming (GWP 100a)	3,25E + 00	1,94E + 00	kg CO_2-Eq	-40%
All Primary Energy Resources	4,81E + 01	2,57E + 01	MJ	-47%
Water Consumption	2,62E - 01	6,26E - 02	m^3	-76%
Depletion of Abiotic Resources	1,87E - 02	1,17E - 02	kg Sb	-37%
Acidification	6,71E - 03	2,40E - 03	kg SO_2-Eq	-64%
Eutrophication	6,83E - 04	-1,46E - 03	kg PO_4-Eq	-314%
Photochemical Oxidation	4,51E - 04	1,54E - 04	kg ethylene	-66%

Based on the methodology and on the results of the Eco-Footprint Study, VinyLoop® has developed a new tool to calculate the footprint for typical applications of VinyLoop® R-PVC such as garden hoses, membranes and shoe soles.

Smart solutions for sustainable purchasing

VinyLoop® is a smart solution for all those who want to comply with more sustainable production, resource efficiency and public procurement, set by regulators at national and international level.

With its environmental benefits in terms of energy saving and CO_2 emission reduction, VinyLoop® R-PVC is an important resource to produce a lower environmental footprint and high technical/quality performance products, in line with green public procurement requirements by public administrations.

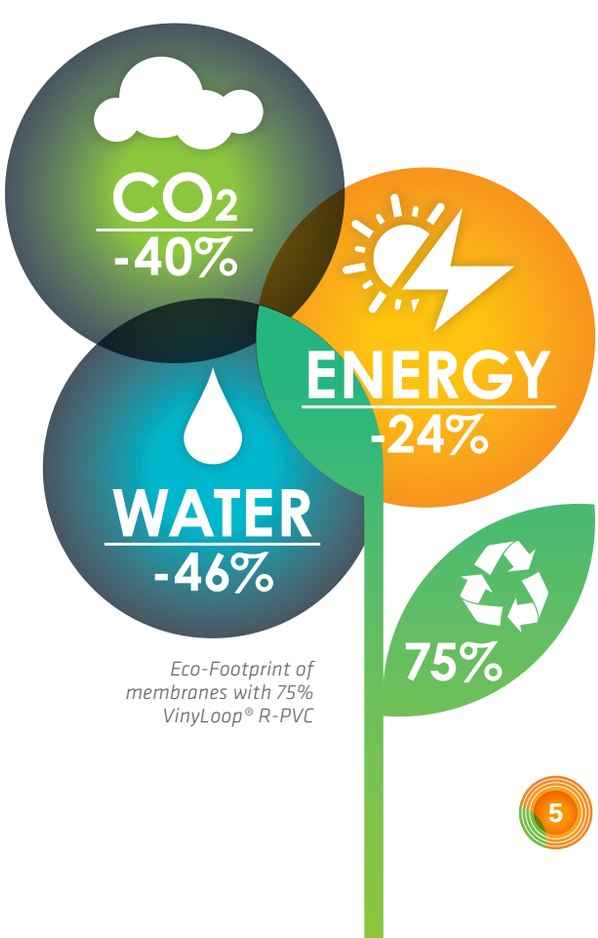
Green public procurement is defined by the EU as a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function.

Brand holders and retailers of products made of VinyLoop® R-PVC can help public procurers and public administration decision makers to achieve and communicate their environmental targets, providing them with the environmental footprint of the final products.

Furthermore, products containing recycled PVC can contribute to achieving a better rating in sustainable building certification schemes and labels.

Purchasing goods containing VinyLoop® R-PVC contributes to the achievement of the EU's 'Growth Strategy Europe 2020', which targets a 20% decrease of greenhouse gas emissions and a 20% increase in energy efficiency by 2020.

Membranes made with VinyLoop® recycled material, for example, can save an average of 40% of greenhouse gas emissions, 46% of water consumption and 24% of energy consumption (these figures are based on the assumption of using at least 75% of R-PVC instead of virgin compound.
The percentage of R-PVC used can increase up to 100% depending on the converter's choice).



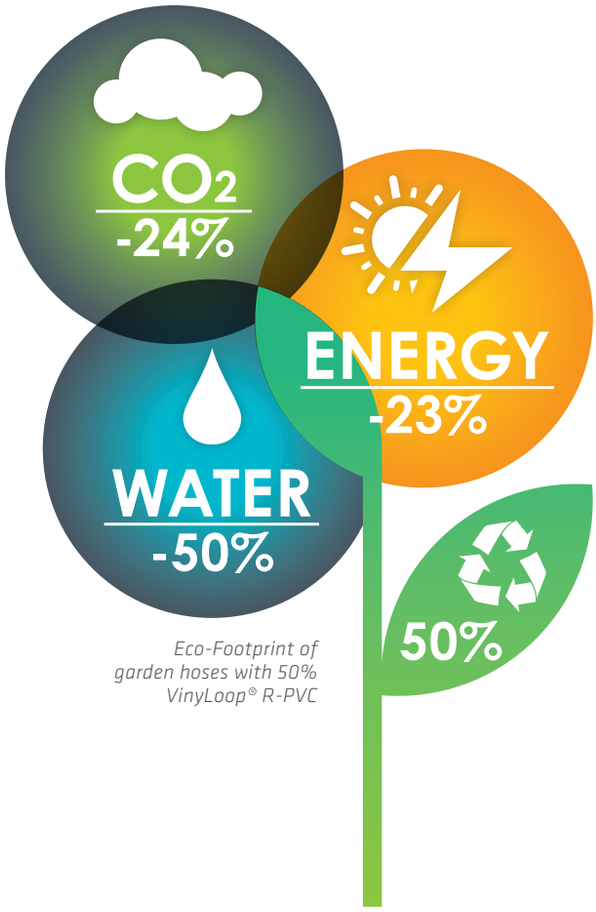
Eco-Footprint of membranes with 75% VinyLoop® R-PVC

VinyLoop: an added value for final consumers

Along with the growing environmental awareness in Europe, consumers are increasingly looking for lower environmental impact products.

According to the Eurobarometer 2011 on 'Attitudes of Europeans towards resource efficiency', 86% of EU citizens said they would buy products made of recycled materials and eight out of 10 EU citizens felt that a product's environmental impact was an important element when deciding on which products to buy.

Furthermore, in its 'Sustainable consumption and production and sustainable industrial policy', the EU recognises the need to improve the environmental performance of products, increase the demand for more sustainable goods and production technologies, but also to extend voluntary labelling on energy and environmental performance.



Eco-Footprint of garden hoses with 50% VinyLoop® R-PVC

Companies are therefore called upon not only to offer lower environmental footprint products, but also to provide their customers with clear, transparent, easy to understand information on which to base their purchasing choices.

The use of recycled materials is an added value for the environment, since it saves valuable resources (energy and raw materials) and prevents incineration. In this respect, VinyLoop® R-PVC can contribute to a lower environmental footprint of products.

VinyLoop® provide to its clients the environmental footprint of the final products made with its R-PVC.

For example, garden hoses made of at least 50% VinyLoop® R-PVC can save on average 24% greenhouse gas emissions, 50% water consumption and 23% energy consumption. The percentage of R-PVC in the formulation can be increased to over 50%, depending on the choice of the converter.

Eco-Labels and Green Public Procurement

Products containing recyclates are made from materials that otherwise would have been discarded. The VinyLoop® recycling process reduces the amount of waste created and preserves valuable raw materials and energy.

VinyLoop® R-PVC can help products qualify for eco-labels and environmentally preferable purchasing programmes including BREEAM®, Carbon Reduction Label, SCS Recycled Content Certification and others.

The VinyLoop process and R-PVC

VinyLoop® is a physical, solvent-based recycling technology that produces high quality R-PVC (recycled PVC) compounds. The process separates the PVC compound from other materials (other plastics, rubber, metal, textile and others) by selective dissolution and filtration.

The VinyLoop® R-PVC compounds can be processed by extrusion, calendering and injection moulding to various applications, such as hoses, foils, geo-membranes or shoe soles. The R-PVC compound VinyLoop® can be considered a 'virgin' material in terms of quality and property consistency.

The quality consistency is a unique asset of VinyLoop® R-PVC which cannot be guaranteed by the traditional mechanical recycling techniques.

VinyLoop® was assessed and successfully audited for REACH and CLP (Classification, Labelling and Packaging of substances) Regulations by Certiquality and Centro REACH in July 2011.

The company

VinyLoop Ferrara S.p.A. is a partnership between INOVYN S.p.A., one of the largest PVC producers in Europe, and the leading French manufacturer of composite membranes Serge Ferrari. Its plant in Ferrara, Italy, was inaugurated in 2002 and treats 10,000 tonnes/year of PVC scraps; it is also used as a pilot plant for industrial research.

The company

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is a partnership between:

INOVYN Italia S.p.A.
one of the largest PVC producers in Europe.

Serge Ferrari sas
the French leader in tarpaulin manufacturing.

www.vinyloop.com

The present White Paper is compliant with the UNI ISO 14021: 2012 'Environmental labels and declarations - Self-declared environmental claims (Type II environmental labelling)' requirements.

Supporting the European PVC industry's Voluntary Commitment