



# SUSTAINABLE IDENTITY

Grégory Magnasco explores the environmental challenge of polycarbonate and recycled plastics in identity documents

**A**s the ecological transition becomes a global priority, the identity document industry is also called upon to rethink its practices. Long focused on security, physical durability and technological innovation, the industry is now evaluating a new performance pillar: its environmental footprint.

Traditionally, identity cards, passports and other secure credentials are made from virgin synthetic materials selected for their robustness and capacity to integrate advanced security features. Polycarbonate has become the material of choice thanks to its longevity, tamper resistance and compatibility with laser personalisation. However, this technical excellence can no longer obscure a central issue: the environmental impact of these materials, particularly their fossil origin and high carbon footprint.

From a lifecycle perspective, polycarbonate remains a robust solution. Its durability enables identity documents to last more than ten years, reducing the need for frequent

renewals and the associated consumption of raw materials. Still, this benefit must be weighed against the fact that polycarbonate production continues to rely on fossil resources and generates a significant carbon footprint. On average, its impact is 2.5 times greater than other plastics we use, such as PVC, representing approximately 3,000 tons of CO<sub>2</sub> emissions in 2024 for a company like Linxens.

Polycarbonate has long been a material of concern in international sustainability discussions. As early as COP12 in Nairobi in 2006, it was identified as a material to watch due to its production cycle and environmental impact. Nearly two decades later, the industry must urgently accelerate its work to improve material sustainability while maintaining secure reliability. The need for action is clear.

Notably, there is currently no global or even European regulation requiring the use of recycled materials in identity documents. Nonetheless, some industry players have proactively chosen to embed environmental considerations into their operations. For them, it is not

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about waiting for regulatory pressure, but anticipating market and government expectations through a voluntary, forward-thinking approach.

Governments themselves face political climate commitments. They also collaborate with technology partners who are, or will be, subject to regulations such as the EU's Corporate Sustainability Reporting Directive (CSRD) and the Corporate Sustainability Due Diligence Directive (CS3D). These partners are starting to demand tangible action from their suppliers. Though not yet standardized or widely enforced, these expectations reflect a growing trend. Public buyers want to demonstrate environmental leadership, including in the identity sector.

This also highlights a regulatory gap. Whereas the banking sector already benefits from structured frameworks for eco-designed payment cards, the identity document space is advancing more slowly.

Explicit demand for environmentally responsible identity documents remains marginal. There is no well-structured market trend yet, and public tenders rarely include concrete requirements around material sustainability. That said, awareness is gradually building. More and more governments are including CSR criteria in their procurement guidelines, even if they remain largely declarative at this stage. This is a slow but meaningful shift that could accelerate once the CSRD is fully implemented for public and private institutions alike.

Pilot projects are emerging, particularly in Europe, to integrate recycled materials into short-lived documents such as access badges or transit passes. These initiatives show that using recycled plastics is not only feasible but effective, with no compromise on readability or structural integrity.

More advanced testing has recently been carried out on highly secure documents such as national ID cards made from recycled polycarbonate containing between 30 percent and 98 percent recycled content. These prototypes passed ISA (International Standards Assessment) tests, confirming the technical feasibility of such a transition. Results show that security, the industry's non-negotiable core, remains intact as long as critical elements like holograms, optically variable inks and multilayer structures are properly integrated. The key challenge now is standardising and ensuring the long-term reliability of these materials while meeting strict requirements for durability and personalisation.

Using recycled materials is just a starting point. The entire design of identity documents must be reimaged. This includes reducing unnecessary layers, optimising lamination processes, selecting inks compatible with recycling and even designing collection systems for end-of-life recovery of used cards.

For over five years, this approach has been integrated into structured CSR programmes by several industry players. The goal is not to offer a standalone green product, but to deliver a holistic solution that meets environmental, economic and security standards. This also means being able to measure carbon impact.

Beyond mechanical recycling, which degrades polymer quality over time, major strides have been made in chemical recycling. Researchers at the University of Bath have developed a depolymerisation method at room temperature using zinc complexes and methanol. This technique recovers base monomers such as bisphenol A and DMC, opening the door to nearly infinite polycarbonate recycling.

Beyond its ecological promise, this could change how the industry manages plastic waste by enabling circular production of high-value materials that could be reused in biomedical or digital identity applications.

Europe currently leads in integrating environmental thinking into identity document design. Its pilot programmes are promising, but broad adoption will depend heavily on local political priorities and regulatory timelines.

Regions such as South America and parts of Africa are taking a different path. Without legacy systems to overhaul, they can adopt cutting-edge eco-technologies more directly and accelerate their transition faster.

**POLYCARBONATE IS THE MATERIAL OF CHOICE THANKS TO ITS LONGEVITY AND TAMPER RESISTANCE**

Cost remains the main barrier. Recycled materials are about 25 percent more expensive than virgin materials, which can weigh heavily on publicly funded projects. When state budgets are at stake, justifying the added cost requires clear political commitment. Yet many players in the identity ecosystem believe that these costs will be offset over time by reduced carbon footprints, greater supply chain transparency and improved public perception. As demand for recycled materials grows, price differences are also expected to narrow.

A key obstacle to adopting recycled materials in ID documents has historically been the fear of compromising security. But recent developments show that this concern is no longer justified. Security does not depend on the material itself, but on the protective elements added to it such as holograms, inks and multilayer structures, which remain effective regardless of the base substrate.

In this way, the identity card, and secure documents more broadly, can symbolise the balance between technological innovation and environmental responsibility. Industry players who embrace this path send a clear message. Sustainability and security are not opposites. They reinforce each other. States that invest in innovation are not turning away from sustainability. On the contrary, they are preparing for a more responsible future.

The integration of recycled polycarbonate and sustainable plastics into identity documents is not merely a technical adjustment. It is a strategic move aligned with the United Nations Sustainable Development Goals and anticipates future regulations.

In an industry still lacking strong sustainability regulations, proactive initiatives are setting an important precedent. They show that performance, security and environmental responsibility can go hand in hand while addressing growing public expectations.

The challenge is no longer just technical or economic. It is ethical and political. Governments must act swiftly. Let us not forget that according to a June 2025 OECD report, climate action could deliver net gains of 0.23 percent in global GDP by 2040. Ultimately, those who move first in this transformation, governments and private actors alike, will be best positioned to lead in a market undergoing fundamental change ●

**THE SYSTEMS TO PROTECT  
ATTENDEES STRUGGLE  
TO KEEP UP AS EVENTS  
GROW MORE COMPLEX**

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