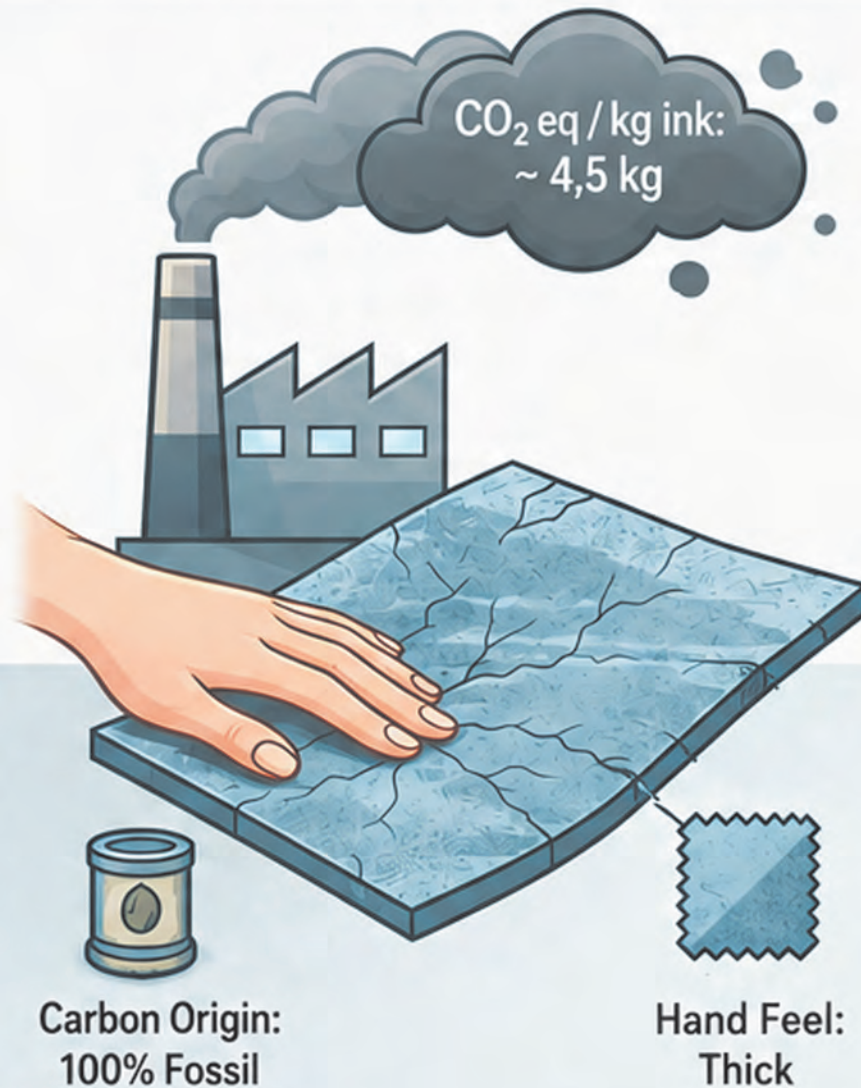


Bio-based Inks: The New Frontier of Sustainable Screen Printing

The screen printing industry is replacing petroleum-derived polymers with vegetable resins and natural pigments. Bio-based inks drastically reduce industrial performance impacts and conform to international standards options.

FOSSIL-BASED & TRADITIONAL



SCIENCE AND NATURE IN A JAR

Bio-based



Biodegradable

Bio-based indicates origin from renewable sources; biodegradable indicates the ability to decompose — they are not the same thing.



Natural Bio-based Pigments:

Offer organic aesthetics and low toxicity, requiring attention to UV stability.



PERFORMANCE & REAL IMPACT



Limited series testing



Green analysis



Transparent communication

BIO-DERIVED & SUSTAINABLE



DIRECT COMPARISON: TECHNOLOGY & SUSTAINABILITY

Traditional Plastisol

100% Fossil

$\sim 4,8 \text{ kg CO}_2 \text{ eq / kg ink}$

Thick

Bio-based / Natural

50-100% Renewable

$\sim 2,0 \text{ kg CO}_2 \text{ eq / kg ink}$

Soft



● Strict tests
Green analysis

● Certification
compliant

V7.0

Bio-based Inks: The New Frontier of Sustainable Screen Printing

The screen printing industry is undergoing a fundamental chemical transition: the replacement of petroleum-derived polymers with vegetable resins and natural pigments. Bio-based inks are not an environmental compromise at the expense of performance — they are a technologically mature category that drastically reduces the carbon footprint while maintaining the required industrial performance and compliance with the most demanding international textile standards.

Science and Nature in the Jar

First, an essential terminological distinction that the market frequently confuses: **bio-based** and **biodegradable** are not synonyms. Bio-based indicates the origin of the material from renewable sources — plant-derived, natural, non-fossil. Biodegradable describes a material's ability to decompose under specific conditions. A product can be bio-based without being biodegradable, and vice versa. Confusing the two terms in communication is an error that undermines the credibility of any sustainability message.

Natural and Bio-derived Pigments are the chromatic component of this chemical revolution: they offer an organic aesthetic and low toxicity that conventional synthetic pigments cannot match. Their technical limitation requiring careful management is UV stability — natural pigments are generally more sensitive to solar radiation than synthetic pigments, and require careful formulation and specific test protocols to guarantee color fastness over time.

Direct Comparison: Technology and Sustainability

The quantitative comparison between Traditional Plastisol and Bio-based/Natural inks is unequivocal across every relevant dimension:

Parameter	Traditional Plastisol	Bio-based / Natural
Carbon Origin	100% Fossil	50–100% Renewable
CO ₂ eq / kg ink	~4.8 kg	~2.0 kg
Hand Feel	Heavy	Very soft

The carbon footprint reduction is **-50%** — from approximately 4.8 kg of CO₂ equivalent per kg of ink to approximately 2.0 kg. This is not a marginal reduction: it is a structural transformation of the environmental impact of the production process that translates into verifiable and communicable data throughout the entire value chain.

Hand feel — the tactile sensation of the finished garment — is the performance parameter where bio-based inks express a concrete competitive advantage over Plastisol: the hand is significantly softer, closer to the sensation of bare fabric, more comfortably wearable. For the final consumer it is often the most immediately perceived difference.

Real Performance and Impact: The Implementation Protocol

The transition to bio-based inks requires a structured approach across three sequential phases that validate performance before adoption at production scale.

Limited Series Tests are the mandatory starting point: before any significant production commitment, the new formulation must be validated on limited series under the exact production conditions — same mesh, same press, same substrate, same curing process. Laboratory tests are necessary but not sufficient: the variables of real production processes produce behaviors that standardized tests do not fully replicate.

Economic Analysis is the second step: bio-based inks typically have a higher purchase cost than conventional Plastisol. However, a complete economic analysis must include all costs of the production cycle — reduced disposal costs, lower ventilation requirements, potential waste reduction due to better hand feel, premium positioning value of the finished product. The total cost of ownership is often more favorable than the purchase cost alone suggests.

Transparent Communication of Benefits is the third element: the environmental advantages of bio-based inks are real and measurable, but must be communicated with precision and honesty to build credibility. Certifications such as **REACH**, **ZDHC**, **OEKO-TEX**, and **Global Organic Textile Standard v7.0** provide the independent external validation that transforms sustainability claims into verifiable guarantees.

Safety and Certifications

Industrial-quality bio-based inks are in full compliance with the most demanding global standards: REACH for European chemical safety, ZDHC for hazardous substance management in the textile supply chain, OEKO-TEX for textile product safety, and the Global Organic Textile Standard in its most recent version. This compliance is not optional — it is the prerequisite for accessing premium markets and international brands that require documentation of the sustainable supply chain.