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Solutions for Textile Integrated Circular Economy

Funded by the European Union

From local actions to industrial innovations: SOLSTICE mid-project results

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Mapping the Circular Textile Landscape in Europe

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GRENOBLE ALPES MÉTROPOLE

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Understanding the Current Circular Textiles Ecosystem

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Understanding the Current Circular Textiles Ecosystem

The textile industry is at a turning point, facing **urgent challenges in sustainability, waste reduction, and circularity.**

One major issue is the **lack of infrastructure and services that encourage Repair, Reuse, and Repurposing of textiles,** which prevents citizens from fully engaging in circularity.

The **SOLSTICE project** emerged from this need to **rethink how regional ecosystems can support circularity**.

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To achieve this, **Circle Economy and other SOLSTICE partners** focused on understanding the circular textile ecosystems in **4 key territories: Grenoble-Alpes Métropole, Berlin, Prato, and Catalonia.**

Understanding the Current Circular Textiles Ecosystem

Grenoble stands out for its strong reuse and repair culture, supported by a high-tech and research-driven economy.

Berlin has become Europe's capital of circular fashion, where creativity and sustainability meet innovation.

Prato is a pioneer of recycling and industrial symbiosis, with a circular culture deeply rooted in its textile history.

Catalonia blends a diverse industrial base with strong recycling infrastructure and a growing network of sustainable brands.

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Regional Analysis of the European Textile Ecosystem

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Regional Analysis of the European Textile Ecosystem

The analysis compared four European territories Berlin, Grenoble, Prato, and Catalonia to understand how local textile systems operate and where circularity can grow.
While the global textile sector remains largely linear, the study highlights the growing relevance of territorial approaches.

Circular services like repair, reuse, and recycling tend to cluster in urban centres, leaving peripheral areas underserved. Each region shows a unique balance between production, consumption, and waste flows, emphasizing that no single model can fit all territories.

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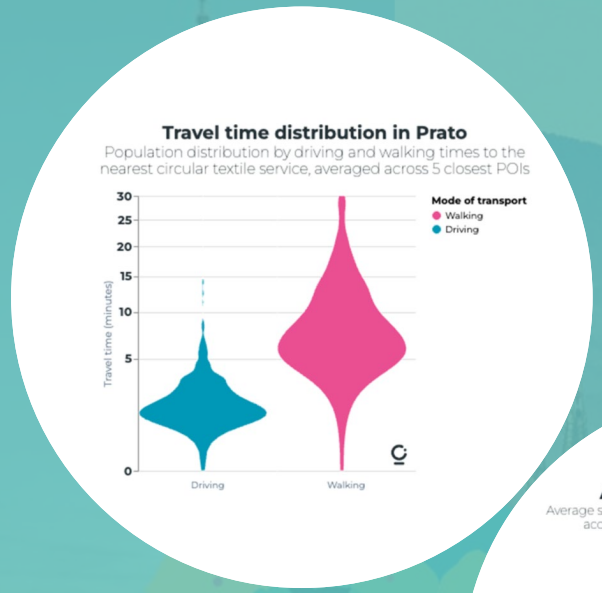
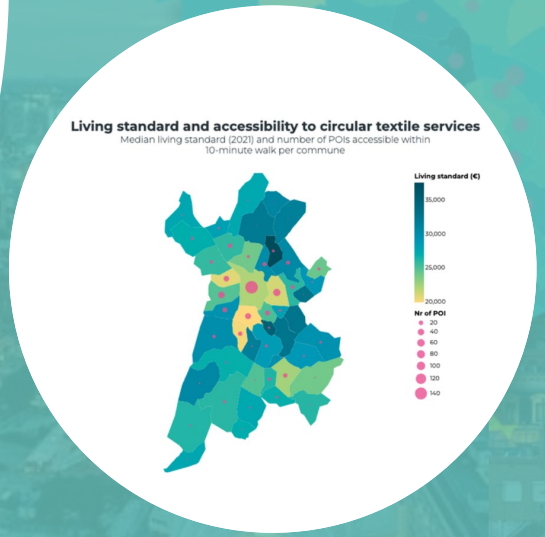
Snapshot of the 4 Territories

Berlin and Grenoble mainly act as consumption hubs, with small-scale production and concentrated repair or resale services in central areas. **Prato stands out with its strong industrial base**, exporting two-thirds of its textile output and employing almost a quarter of its population in the sector**. Catalonia collects significant textile volumes but still depends heavily on landfill and incineration**, with limited local reuse.

Across regions, accessibility and employment reveal large disparities, calling for better integration of local networks and value chain actors.





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Opportunities and future directions

Developing local repair and reuse services can reduce textile waste exports while creating new employment opportunities and strengthening recycling capacity in regions like Prato and Catalonia will further support local circular flows.

Ensuring that these circular services reach beyond city centers to suburban and rural areas is crucial for broader impact.

Lasting change requires public engagement, practical incentives, and strategies developed in collaboration with local communities, **customised to the specific needs of each territory** to advance Europe's textile system toward true circularity.

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Engaging Citizens in Circular Textile Practices

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Boosting the Adoption of Jeans Repair

SOLSTICE Berlin Pilot

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REPAIR DEAL

REPAIR DEAL

REPAIR DEAL

Boosting the Adoption of Jeans Repair

As part of SOLSTICE, **Circular Berlin developed the REPAIR DEAL**, a pilot programme to encourage Berliners to repair their denim jeans rather than discard them.

By combining a **digital bonus system with local repair services,** the pilot creates a **win-win ecosystem**: customers save money, repair shops secure steady income, and together we move toward a **zero-waste city vision**.

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REPAIR DEAL

How the REPAIR DEAL works?

The pilot engages both consumers and repair shops through **two complementary approaches.** First, the **digital bonus system** allows Berliners to fill out a simple online form, **receive a 50% discount voucher, and drop off their jeans at a partner tailor**, who repairs them and returns them ready to wear.

In parallel, the pilot organises **Repair Days and community events**, where participants can attend **workshops, panels, roundtables, evening events, and free repair stations,** promoting awareness, learning, and active engagement with circular fashion practices.

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Gamification for Sustainable Behaviours

SOLSTICE Prato Pilot

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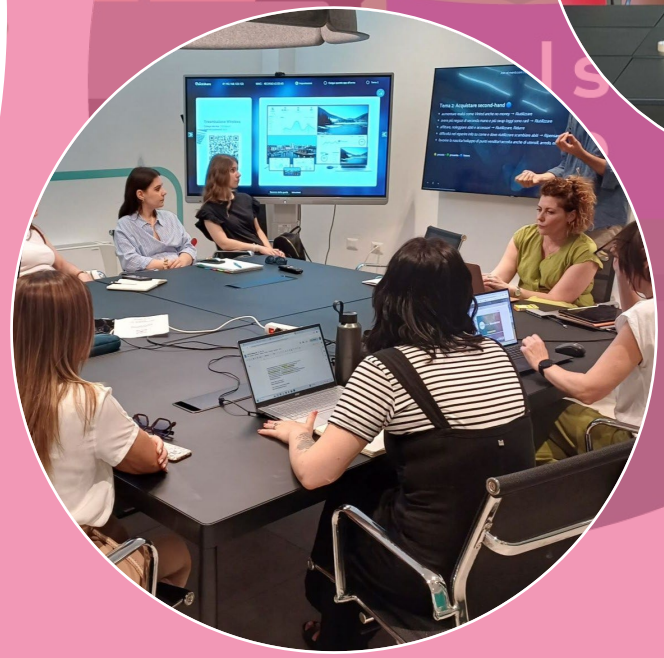
Understanding Users to Gamify Sustainability

The development of the greenApes app for Prato was guided by a **participatory co-design approach**, with workshops providing valuable insights into citizens' daily practices, motivations, and challenges related to clothing repair, reuse, and recycling.

The collected data helped define a preliminary set of app functionalities, including educational content, spaces to share best practices, social interaction, systems to validate sustainable actions, and features for proposing or signaling local events and rewards.



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How does the Gamified App work?

The app, launched in November 2025, aims to guide citizens towards more sustainable habits in a simple, engaging, and free way. Users can explore interactive content such as videos, quizzes, and articles to learn how to take care of, repair, and recycle their clothing.

A digital map shows local points of interest, including shops, workshops, and organisations offering services for clothing reuse and recycling. The app also encourages **community interaction**, allowing users to share ideas and best practices.

Finally, a **gamification system rewards positive actions**: points earned by engaging with content or checking in at participating locations can be converted into discounts, cultural experiences, or donations to local social and environmental projects.

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Enabling Textile Circularity from Sorting to Recovery Pathways

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Textile Pre-processing & Sorting for Chemical Recycling

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Automated Textile Sorting Success

SOLSTICE partner Pellenc ST conducted two industrial pilots on Alia Servizi Ambientali Spa's post-consumer textiles using the Nouvelles Fibres Textiles's automated line.

This process integrates **dual-stage sorting** with "hard point" removal to produce high-quality feedstock for chemical recyclers. The trials successfully delivered PET, EL, and PU batches, with **PET purity reaching >96%.**

Only PA fabrics could not be found in sufficient amounts in mixed post-consumer textiles.

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Remaining Challenges on Textile Sorting

Despite significant progress in automated textile sorting technologies, some technical challenges remain to be addressed.

These include the reliable **detection of very low elastane content (<5%) in mixed fabrics**, which is critical for accurate material classification, as well as the **sorting of multilayered textiles** that combine multiple bonded materials.

In addition, the **effective removal of plastic hard points** remains a challenge.

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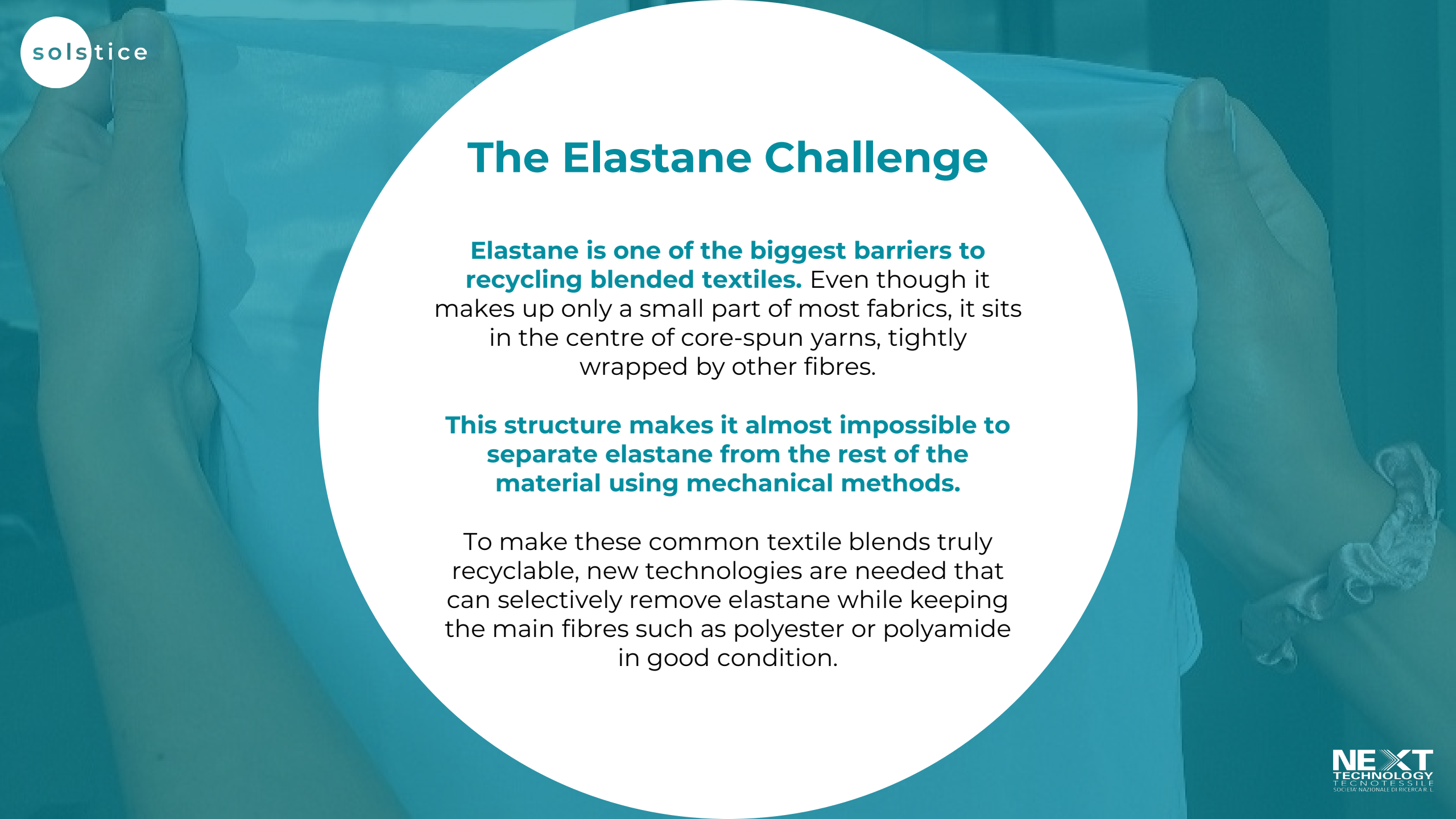
Thermo-Chemical Process for Selective Elastane Removal



The Elastane Challenge

Elastane is one of the biggest barriers to recycling blended textiles. Even though it makes up only a small part of most fabrics, it sits in the centre of core-spun yarns, tightly wrapped by other fibres.

This structure makes it almost impossible to separate elastane from the rest of the material using mechanical methods.

To make these common textile blends truly recyclable, new technologies are needed that can selectively remove elastane while keeping the main fibres such as polyester or polyamide in good condition.

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NTT's Solution: Selective Elastane Removal

SOLSTICE partner NTT has developed a thermo-chemical process that dissolves elastane from PES/EL and PA/EL fabrics while leaving the main fibres intact.

Using a closed-loop solvent system, the elastane is separated and recovered, and the remaining polyester or polyamide can be reused.

Tests on pre-consumer textiles show clear fibre recovery, and the reclaimed PES and PA have already been turned into non-woven panels and recycled pellets for new yarns.

NEXT TECHNOLOGY TECNOTESSILE SOCIETÀ NAZIONALE DI RICERCA R. L.

NTT's Pilot process

Pre-consumer PET/EL and PA/E fabrics

Cutting phase

Elastane removal treatment

Recovered PET

Recovered PA

Recovered EL

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Valoramix

Identifying Viable Recovery Pathways for Textile Feedstock

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What is Valoramix?

Valoramix is a decision-support tool developed by Techtera. It is designed for sorting, material-preparation and recycling professionals, helping them optimise material flows and valorisation pathways by placing economic simulation at the heart of decision-making. The platform makes it easy to test transformation scenarios, simulate material yields and costs, and evaluate the technical and economic performance of each option.

By putting economic viability simulation at the core of decision-making, Valoramix offers an innovative way to optimise textile recovery and accelerate the transition toward a more circular industry.

Techtera
TISSÉ EN AUVERGNE-RHÔNE-ALPES

How the tool works step by step?

Characterise your feedstock: define material, format, condition and colour to build a shared framework across the chain.

Visualise your flows: map current textile feedstock streams from sourcing to valorisation, uncovering untapped residual units.

Match with the right outlets: evaluate compatibility between feedstocks and outlet requirements, prioritise viable pathways.

Explore scenarios & simulate costs & performance: rearrange process steps and technologies, compare scenarios, generate cost estimations and test viability of each valorisation route.

More information on:

www.solstice-project.eu

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Project ID:
Call: HORIZON-CL6-2023-CircBio-02-1-two-stage
Type of action: HORIZON Innovation Actions
Grant Agreement N°: 101134989
Total budget: 11 098 450€
EC: 10 165 375.39€
Starting date: 1 May 2024
Duration: 42 months
Coordinator: Axel'One

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