

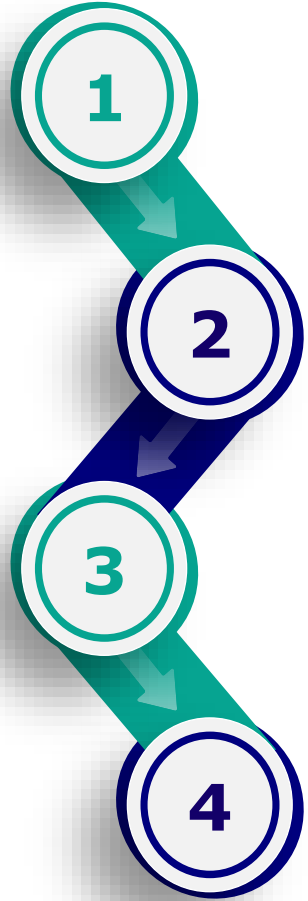


FutureScale^x

CASE STUDY

Driving raw material diversification through sustainable non-wood fibers

Executive summary: A global pulp producer advances feedstock diversification through strategic supply chain analysis



SITUATION

A global leader in sustainable packaging and paper production sought to diversify its raw material base by exploring non-wood fiber sources. The initiative focused on enhancing sustainability in key European markets.

CHALLENGE

The company needed to identify regional supply chains and feedstocks in target European countries that could deliver scalability, cost-effectiveness, and environmental benefits while minimizing Scope 3 emissions.

SOLUTION

FutureScaleX (FSX) developed a structured four-step framework to assess non-wood fiber sources. The approach included: creating a long list of options, analyzing upstream supply chains, evaluating country-specific insights, and prioritizing the most viable and sustainable sourcing strategies.

IMPACT

- Recommended country prioritization strategies for non-wood fiber sourcing.
- Identified 8 feedstocks with highest potential for scalability and sustainability.
- Proposed supply chain partners and engagement strategies to support diversification efforts.



Business context

Our client, a global leader in sustainable packaging and paper production, is advancing its raw material diversification strategy to reinforce its sustainability commitment. A key focus of this initiative is exploring non-wood fiber sources to improve environmental performance, reduce supply chain risks in key European markets, and meet growing regulatory and market demands for greener solutions.

FSX was engaged to evaluate the potential of non-wood fibers and deliver actionable recommendations aligned with the client's goal of cutting Scope 3 fossil CO₂e emissions by 50% from 2019 levels by 2030, while fostering long-term sustainable growth.

Business requirement

The client enlisted FSX's expertise to perform a comprehensive analysis of non-wood fiber streams across key European markets. The study focused on evaluating the availability, pricing, seasonality, quality, and fiber composition of these feedstocks. It also assessed supply chain viability and environmental impacts, including CO₂ emissions, water usage, land use, and soil remediation.

This in-depth analysis was designed to support strategic decision-making for prioritizing countries and feedstocks, enabling the client to achieve raw material diversification and ensure long-term sustainability.

The FSX solution framework

FSX utilizes a 4-step process to Enable efficient and sustainable non-wood fiber sourcing strategies

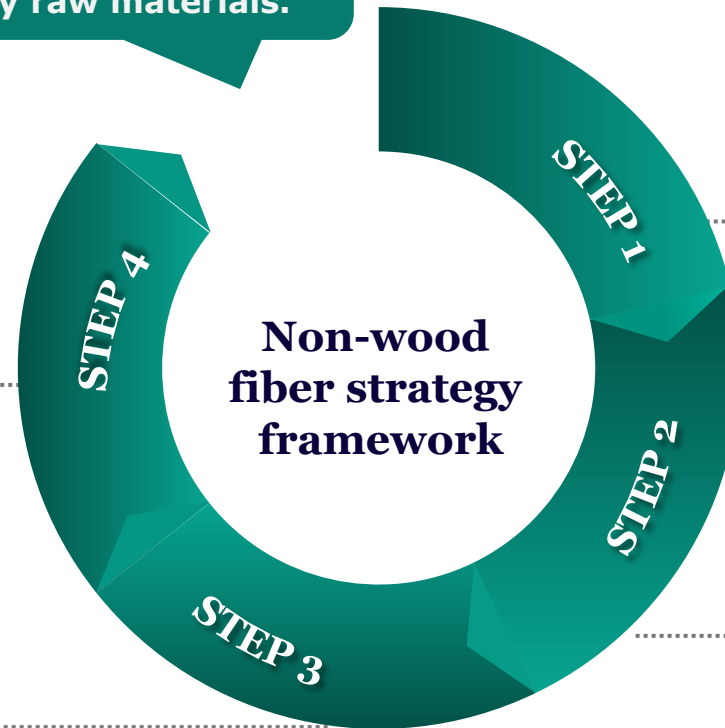
Clearly defined roadmap to optimize supply chains and diversify raw materials.

COUNTRY PRIORITIZATION & ACTION PLAN

- Prioritize countries using an attractiveness matrix and provide strategic recommendations for next steps.

COUNTRY-SPECIFIC INSIGHTS

- Identify target feedstocks, available volumes, and define procurement strategies.
- Define the supply chain structure and highlight key sourcing hotspots.



NON-WOOD FIBERS LONG LIST

- Identify and compile non-wood fibers suitable for paper and pulp
- Pre-screen and select feedstocks based on relevance to paper applications and supply chain feasibility.

UPSTREAM SUPPLY CHAIN ANALYSIS

- Estimate feedstock availability, pricing, and demand across key suppliers and regions.
- Assess environmental impacts (water, CO2 footprint) and fiber quality (length, composition).

Impact

- Prioritized key countries for supply chain development by evaluating supply chain maturity, feedstock availability, and volume potential to optimize procurement strategies across European markets.
- Conducted a comprehensive upstream supply chain analysis, identifying the top eight feedstocks in target countries, based on market availability and environmental impact, to streamline procurement alignment across regions.
- Developed a strategic partner engagement plan, identifying critical supply chain partners in priority countries and outlining actionable steps to enable sustainable and efficient feedstock procurement.

Sample output

Prioritize Country #1, followed by Country #2; deprioritize Country #3 for feedstock #1 utilization

FSX RECOMMENDATION ON COUNTRY PRIORITIZATION AND NEXT STEPS

- Prioritize Country #1; focus on feedstock #1 and feedstock #2 through company A and XXXX (via association AAA)
- Next target Country #2 for feedstock #1 and feedstock #2 via XXXX connections through cooperatives & associations
- Deprioritize Country #3 and Country #4 for feedstock #1; focus on feedstock #2 via company A/ company B / company C

Critical considerations:

- Buy-sell mechanism is in near XXXX state for XX countries; >XX% of transactions happen directly with farmers
- Creating a XXXXX will be one of the key steps to tap the full potential of biomass volumes in the future
- XXXX education (direct or indirect) is critical to onboard them to the idea of selling to XXXXX vs. XXXXX

COUNTRY ATTRACTIVENESS MATRIX

Channel Maturity (Organized vs. Unorganized) vs. Actual Available Volume (in million tons)

Country #1: High maturity, high volume. Country #2: Low maturity, high volume. Country #3: High maturity, low volume. Country #4: Low maturity, low volume.

Channel Maturity
Organized: Trade through controlled suppliers or established bodies.
Unorganized: Local trade by farmers without supplier involvement.

Country #1 : Supply chain strategy

SUPPLY CHAIN STRUCTURE AND PROCUREMENT PROCESS

01 For Feedstock #1

The current trade is XXXX and XXXX, led by XXX at an average price of ~€XXX/ton*. Engaging with cooperatives such as AAA and BBB enables a direct link to XXXX, as they possess the contact details of XXXX in country #1. XXXX prefer one-year contracts due to weather risks; To secure long-term contracts, address XXXX concerns on ROI, strategic intent, purpose of use, and annual volume needs, considering weather risks.

02 For Feedstock #2

Collaborating with company AA for feedstock #2 procurement is an efficient option; Minimum pricing of ~€XXX/ton considering XXXXX application

* - Wet basis, applicable for volumes ranging from XX - XX tons

Sources: FSX analysis, Primary interviews with industry experts.

Country #1 : Feedstock #1 profile

AGRICULTURAL HOTSPOTS

Feedstock #1: Province A (XX%), Province B (XX%), Province C (XX%), Province D (XX%), Province E (XX%), Province A (XX%), Province A (XX%)
 Feedstock #2: Province D (XX%), Province E (XX%), Province A (XX%)
 Feedstock #3: Province F (XX%), Province B (XX%)
 Feedstock #4: Province A (XX%), Province B (XX%)

Volume Availability (Source)	XXX (200 Tons)	Volume Availability (Market)	XX (200 Tons)
Moisture %	XX%	Yield	XX Tons/Hectare
Chemical Composition	Cellulose: 30%, Hemicellulose: 30%, Lignin: 30%, Ash: 30%, Silica: 30%, Others: 30%	Cultivation Area	XX (100 Hectare)
		Form	Fiber
		Average Price	XX Euro / ton
		Length (mm)	XX
		Diameter (um)	XX

Environmental Impact

Impact	Seasonal Availability	Water Footprint	CO2 Footprint	Soil Remediation
	XXX	XXX	XXX	XXX

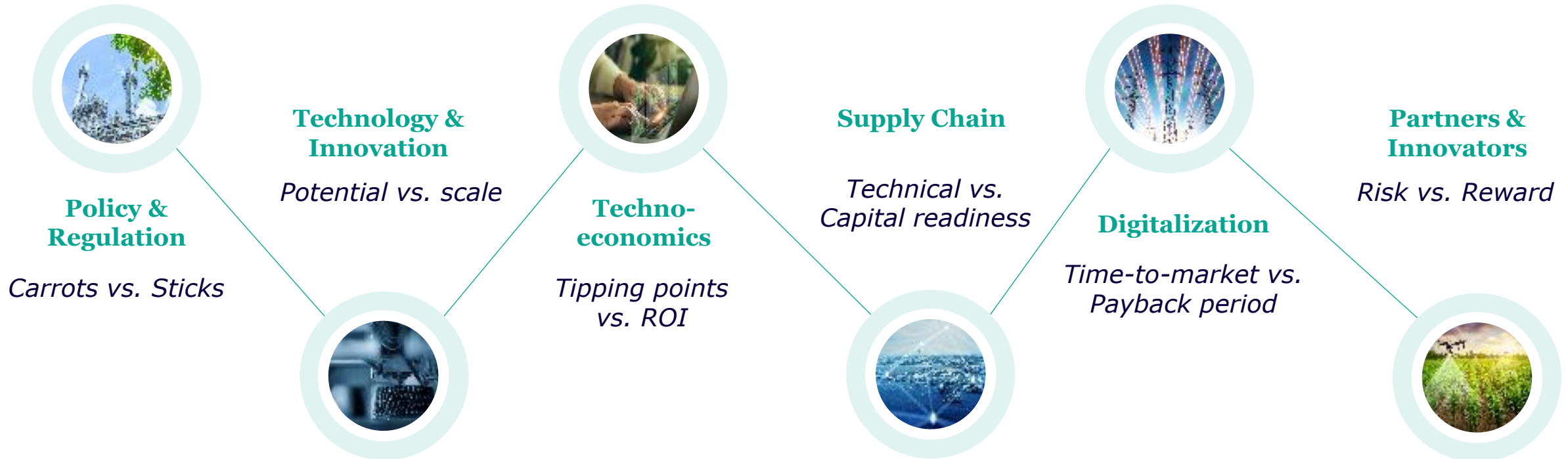
- **Seasonal Availability** | Harvest primarily occurs from XXXX to XXXX, depending on the variety and sowing time.
- **Water Footprint** | For feedstock #1 to reach physiological maturity and its potential yield, it needs on average around XXX mm of water.
- **Land Use** | Feedstock #1 is grown in XXXX land.
- **CO2 Footprint** | XX t CO2eq/ha of feedstock #1 cultivated.
- **Soil Remediation** | Feedstock #1 aids XXXXX, XXXX soil function, and XXXX organic matter content in crop rotations.

Utilization Pattern

- The application of feedstock #1 includes animal bedding, animal feed, soil amendment/fertilizer, XXXXX, XXXXX and XXXX

Note: *Volume Availability refers to wet weight | Data reference year - 2022

Methodology: The FSX Sustainable-Growth-as-a-Service™ Methodology



Connected, systems-level thinking to identify the tipping points and solutions that matter.



Are you ready to grow sustainably?

At FutureScaleX, we believe that the future of business lies in sustainable growth. Our six-lens methodology is more than just an approach—it's a movement towards a more resilient and sustainable future.

FutureScale^X

Connect with us.

To request more information such as a meeting, demo, trial, or referral, please visit our website:

www.futurescalex.com or email
contact@futurescalex.com

Mumbai

Floor 8th, Plot 368, Vivaria Tower
Bhandarkar Rd, Matunga Phul Market,
Mumbai 400019 India

futurescalex.com

contact@futurescalex.com

Singapore

1 North Bridge Road, #18-06 High
Street Centre, Singapore, 179094

futurescalex.com

contact@futurescalex.com

Amsterdam

Transistorstraat 31, 1322 CK
Almere, The Netherlands

futurescalex.com

contact@futurescalex.com

Boston

44 School Street, Ste. 505
Boston, MA 02108 USA

futurescalex.com

contact@futurescalex.com