

## Circular textile value chains

### Business case:

# Textile Fiber Recycling for Industrial Symbiosis in Morocco

## The challenge

In Morocco, the textile and garment industry generates 83,000 tons of textile waste annually, of which synthetic and synthetic blends make up 1/3 with other fibers, unsuitable for efficient transformation in textile-to-textile recycling. This type of waste can be valorized within other value chains and applications, such as the construction sector. The latter represents one of the most promising industries globally, and in Europe, the use of blended textile waste to produce insulation boards has gained traction. These materials have thermal conductivity parameters comparable to traditional insulation materials like glass fiber and mineral wool and provide an eco-friendly alternative to conventional insulation materials.

Recycled textile boards usually come at a higher cost, but in Morocco, they could be produced at a cost-competitive level. This is due to the abundance of locally generated post-industrial low-cost textile waste and the high cost of importing traditional insulation materials from Europe due to transportation and customs duties.

At the same time, locally produced recycled textile insulation boards could be an economically viable alternative for Morocco that can valorize the blended textile waste from Morocco's textile and garment sector while increasing the circularity of the Moroccan textile value chain.

## The scope and actions of the pilot project

Beginning in 2019, the United Nations Industrial Development Organization (UNIDO), under the regional EU-funded SwitchMed Programme, demonstrated how circular economy practices can improve environmental performance and competitive advantage in Morocco's textile value chain.

In 2022, UNIDO initiated a pilot project to demonstrate a business model for valorizing "lower-grade" textile fibers from the post-industrial waste stream of Morocco's textile and garment sector. These fibers cannot be recycled back into textiles but are still suitable feedstock for producing "nonwoven" products, such as insulation material.

Novimat, a Moroccan company already active in the construction material sector, collaborated with UNIDO on this project, utilizing their nonwoven production capacity for product diversification. The Moroccan Federation of the Construction Industry (FNPI) also participated in the project, and other potential investors were also involved in the project to raise awareness about the potential of recycled textiles as insulation materials in textile recycling and nonwoven technologies.

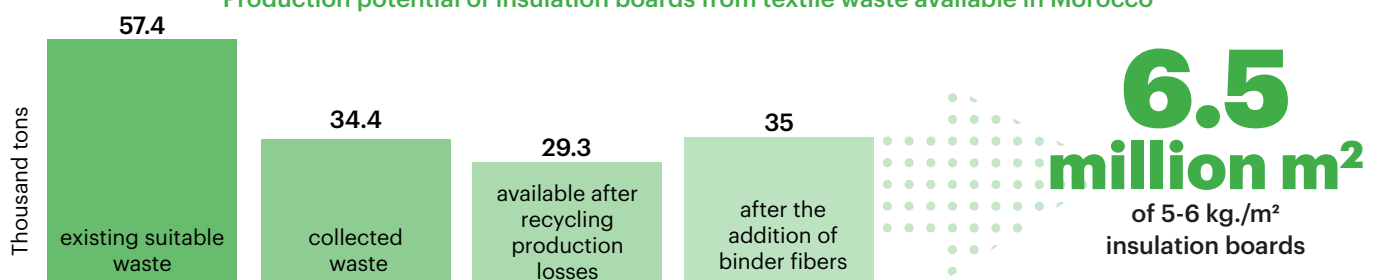
The pilot project set actions that provided technical support to improve Novimat's insulation manufacturing, including study tours and a market study that identified high-growth markets for insulation boards made from recycled textile waste. The project also collaborated with the construction sector, investors, and waste suppliers to develop a policy roadmap to ensure a stable supply of textile waste and investment in developing this value chain.

## Training and technical support

UNIDO mobilized the experts from Centre Européen des Textile Innovants (CETI) to conduct an industrial audit to assess the training needs of NOVIMAT managers. Based on the assessment, dedicated training was designed and delivered to the NOVIMAT team at CETI in France. The training focused on textile recycling and nonwoven technology. It covered topics such as recycling input and output characterization, shredding-tearing processes, and technical characteristics of air-laid and thermo-bonding processes for nonwovens. The training demonstrated examples of nonwoven production with technical details to NOVIMAT managers.

NOVIMAT also received on-site technical support in the air-laid and thermo-bonded nonwoven technology. The technical support involved testing with a few tons of locally sourced recycled fibers, which were found to be of deficient quality. Based on the training and technical support, a report was delivered to NOVIMAT on capacity gaps in the production of nonwovens and a list of actions required to improve quality and efficiency.

Production potential of insulation boards from textile waste available in Morocco



## Pilot project in numbers



### Market study and product portfolio selection

A study was conducted to identify markets with high growth potential and select the most suitable destination market for nonwoven products. The study included a Suitable Products Report, which revealed that textile-waste-based insulation boards for the construction sector were the most promising for Novimat's technical capabilities. The report listed various products within the insulation panels market and their technical details, specifications, and performance requirements.

In 2022, Morocco imported 15,000 tons of conventional insulation materials (polystyrene and mineral wool) valued at Dirham 256 million (€23 million). This amount is estimated to correspond to 2.5 million m<sup>2</sup>, which covers most of the current local demand.

Morocco recently adopted the Règlement Thermique de Construction au Maroc (RTCM), a new green building regulation to transform the construction sector toward energy-efficient buildings. According to the market study, this new regulation will boost Morocco's annual demand for insulation boards to around 10 million m<sup>2</sup> in the coming years. Compliance with the RTCM will require four times more insulation material, generating a cost increase for new houses estimated at 5% to 10%.

Based on available data, the existing volume of textile waste can be used to produce 6.5 million insulation boards, representing about 65% of the estimated market size following the implementation of the RTCM regulation.

By using locally produced insulation boards from recycled textile waste, the cost increase for housing can be limited, and savings on foreign currency for expensive imported materials can be made.

### Investment promotion and technology selection

A business plan was prepared to invest in an integrated textile waste recycling line for manufacturing nonwoven products. The plan was promoted across the business commun-

ity, and potential investors were identified. As part of the investment promotion, a study tour was organized to the ITMA in Milano, the world's largest international textile and garment technology exhibition. The tour involved Novimat and other potential investors. During the visit to ITMA, one investor expressed interest in starting a complete production line made of a recycling unit and a nonwoven production line aimed at producing insulation boards from textile waste. The identified investor established business contacts with the four main equipment manufacturers in Europe and is currently selecting the best offer for the equipment while evaluating financing opportunities.

### The way forward

Based on the market study findings, the project has engaged FNPI, which has declared continued interest in the project objectives. Additionally, nine companies were identified as potential textile waste suppliers for valorizing "low-grade" textile waste that can be used for insulation board production, which is an excellent insulation material. A policy roadmap was prepared to outline the way forward to scale up the results of the pilot and produce an impact on the Moroccan economy.

In Morocco, developing a cost-competitive value chain for insulation board production from recycled textile waste can generate value and employment, reduce waste disposal, and save foreign currency. This pilot project demonstrated the feasibility of transforming textile waste into insulation boards that align with Morocco's economic and environmental goals.

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