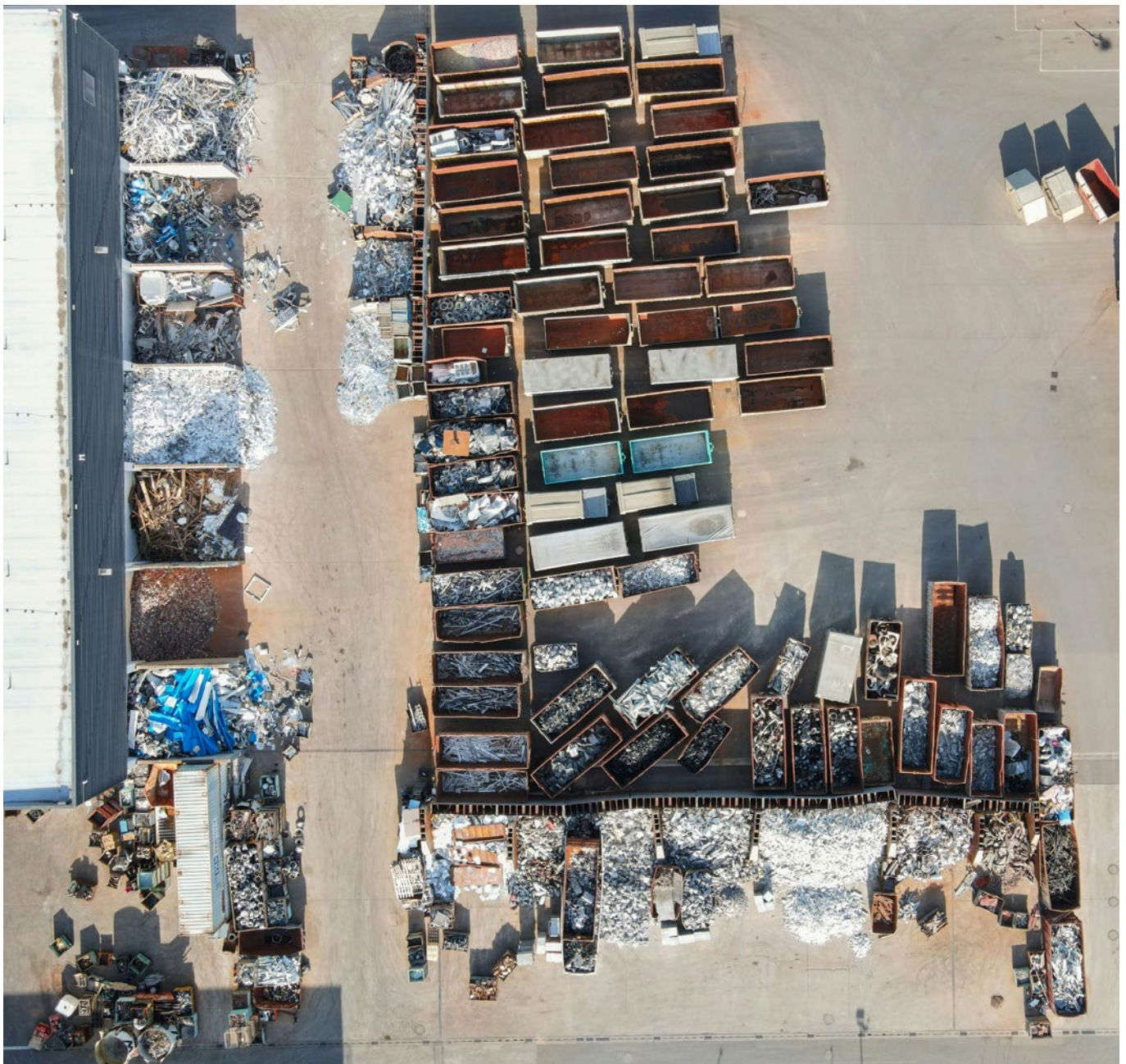


MED TEST III

Advancing resource-efficient and circular business models for industries in the Mediterranean

Project summary and achievements



Co-funding partners:

Funded by the European Union, with co-funding from the Government of Italy and the Government of Catalonia, the SwitchMed Programme is implemented under the lead of the United Nations Industrial Development Organization (UNIDO) in partnership with the United Nations Environment Programme (UNEP) Economy Division and MedWaves, the United Nations Environment Programme Mediterranean Action Plan (UNEP/MAP) regional activity centre for Sustainable Consumption and Production (formerly known as SCP/RAC). The initiative is carried out closely with the European Commission's Directorate-General for Neighbourhood and Enlargement (DG NEAR).

Each implementing organization contributes specialized experience and tools to partner with the eight beneficiary countries on policy development, capacity building, business support services, demonstration activities and networking.

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Foreword

The Mediterranean region is at a crossroads, where the pursuit of economic growth must be reconciled with the urgent need for sustainability. The SwitchMed programme, through its MED TEST industry component, has played a pivotal role in driving the shift toward a circular economy in the region. By focusing on resource efficiency, innovation, and collaboration, the programme has demonstrated the foundation for a transformative industrial model—one that balances economic development with environmental responsibility.

However, the challenges that we are facing are significant. Climate change, biodiversity loss, resource depletion, and pollution are converging crises that threaten both ecosystems and livelihoods. As natural resources become scarcer, sustaining long-term economic growth becomes increasingly difficult. Unsustainable consumption patterns are pushing the limits of what our environment can support. Moreover, issues of energy security, intertwined with the global response to climate change, add another layer of complexity to the region's economic development. These challenges demand a fundamental change in how industries operate, consume resources, and engage with the environment.

The circular economy offers a way forward, out of the linear production model. It presents an opportunity to rethink how we design, produce, and consume in ways that regenerate natural systems, protect biodiversity, and extend the lifecycle of materials. By embracing resource-efficient practices, which are integral to circular business models, industries can decouple economic growth from resource depletion, reduce waste, and enhance resilience across the Mediterranean.

Over the past decade, the program has implemented over 160 pilot projects showcasing the potential for resource efficiency and circularity, both within individual industries and across entire value chains. It has identified investment opportunities worth €100 million. These findings have benefited both businesses and the environment, resulting in annual savings of €50 million in production costs for the companies and a reduction of 218,000 tons of CO₂ equivalent emissions, among other positive outcomes, such as reduced water and material use footprint.

A crucial element of this legacy is the investment in building local capacities and nurturing the next generation of engineers. Since 2014, the UNIDO-led MED TEST projects have trained about 80 local service providers across the Mediterranean region, equipping them with the skills to introduce resource-efficient production practices within industries. Additionally, through collaborations with 18 universities in Jordan, Lebanon, Palestine and Morocco, circular and resource-efficiency practices have been, or are about to be, integrated into the curricula, ensuring that future professionals are prepared to lead the shift toward sustainable industrial practices. By empowering local talent and embedding sustainability in education, we ensure that the expertise needed to drive industrial transformation is both available and rooted within the region.

As we reflect on the achievements of the SwitchMed programme, its legacy extends beyond immediate successes. It highlights the importance of embedding resource efficiency and circularity into industrial development, shaping the Mediterranean's future and serving as a model for sustainable industries globally.

Smail Alhilali
Division Chief,
Chief of the Division of Circular Economy and Green Industry,
UNIDO

The SwitchMed Programme: a catalyst for change in the Mediterranean

The southern Mediterranean region faces significant environmental and economic challenges, including resource depletion, pollution, and socio-economic disparities. Rapid industrialization and urbanization have worsened these issues, leading to environmental degradation and unsustainable resource use.

Since 2014, the European Union (EU)-funded SwitchMed programme has sought to drive a much-needed change by empowering businesses, industries, policymakers, entrepreneurs and civil society organizations to switch from conventional, resource-intensive practices to more sustainable and innovative solutions.

Active in Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Palestine, and Tunisia, SwitchMed has, for the past decade, established itself as a pivotal initiative driving a systemic shift toward **Sustainable Consumption and Production (SCP)** across the region.

Led by the United Nations Industrial Development Organization (UNIDO) and in partnership with the United Nations

Environment Programme (UNEP) Economy Division, MedWaves, and the UNEP Mediterranean Action Plan (UNEP/MAP) regional Activity Center for Sustainable Consumption and Production (formerly SCP/RAC), **the SwitchMed programme has been implemented in two distinct phases: Phase I (2014-2018) and Phase II (2019-2024).** This publication explores the implementation of the SwitchMed Programme's Industry component, also known as MED TEST (Mediterranean Transfer of Environmental Sound Technology), led by UNIDO, designed to promote circularity and improve resource efficiency and cleaner production (RECP) in key industries across the region.

By fostering sustainable practices and offering tailored technical assistance, UNIDO's efforts have sparked innovation and helped lay the groundwork for long-term industrial transformation, reshaping the region's economic and environmental landscape. This document highlights how the initiative has enhanced resource efficiency and supported the development of circular value chains, particularly in industries such as plastics, textiles, dairy, aquaculture, and fish processing.

From vision to action: SwitchMed Phase I (2014-2018)

The first phase of SwitchMed played a central role in demonstrating the viability of sustainable practices across the southern Mediterranean region. The initiative focused on engaging policymakers, small and medium-sized enterprises (SMEs), green entrepreneurs, and civil society to support resource-efficient and circular business models. One key element of SwitchMed's Phase I programme was the industry component MED TEST II, implemented by UNIDO. Through MED TEST II, SwitchMed was positioned as a leading resource efficiency initiative in the southern Mediterranean. It showcased the potential for adopting resource-efficient business models within key industries such as chemicals, textiles, leather, plastics, and food & beverages. Over 125 industry pilots demonstrated the business case of implementing best practices in resource efficiency and circular production within SMEs.

To build long-term capacity in the region, UNIDO trained 44 local service providers in the UNIDO TEST methodology, strengthening regional capacity for RECP assessments.

Additionally, UNIDO initiated collaboration with national financial institutions and international green finance programmes, facilitating SME's access to funding for the implementation of identified RECP solutions worth €87.6 million. As a result, more than 75% of these measures were successfully realized by the project's end.

Building on the success of these demonstrations, UNIDO worked closely with local industry stakeholders and government institutions to develop eight national roadmaps aimed at scaling up resource-efficient practices among industrial SMEs in the region.

Building on success: SwitchMed Phase II (2019-2024)

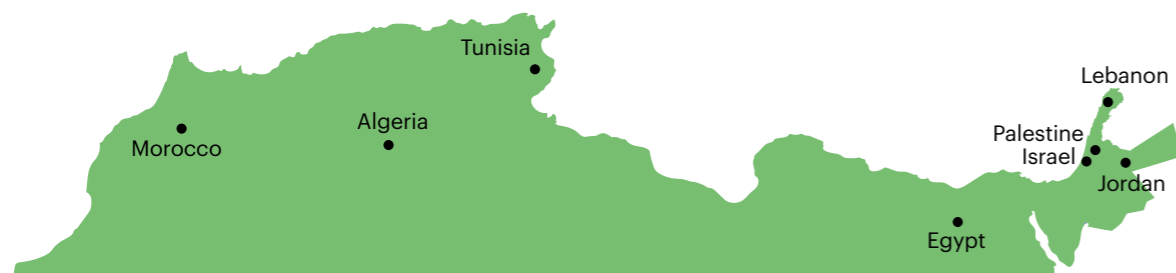
Leveraging on the momentum of Phase I, SwitchMed entered its second phase with the overarching goal of fostering the creation of new green business opportunities and decent employment, while reducing the environmental footprint of existing economic activities in the Mediterranean region. Phase II was organized around four key components:

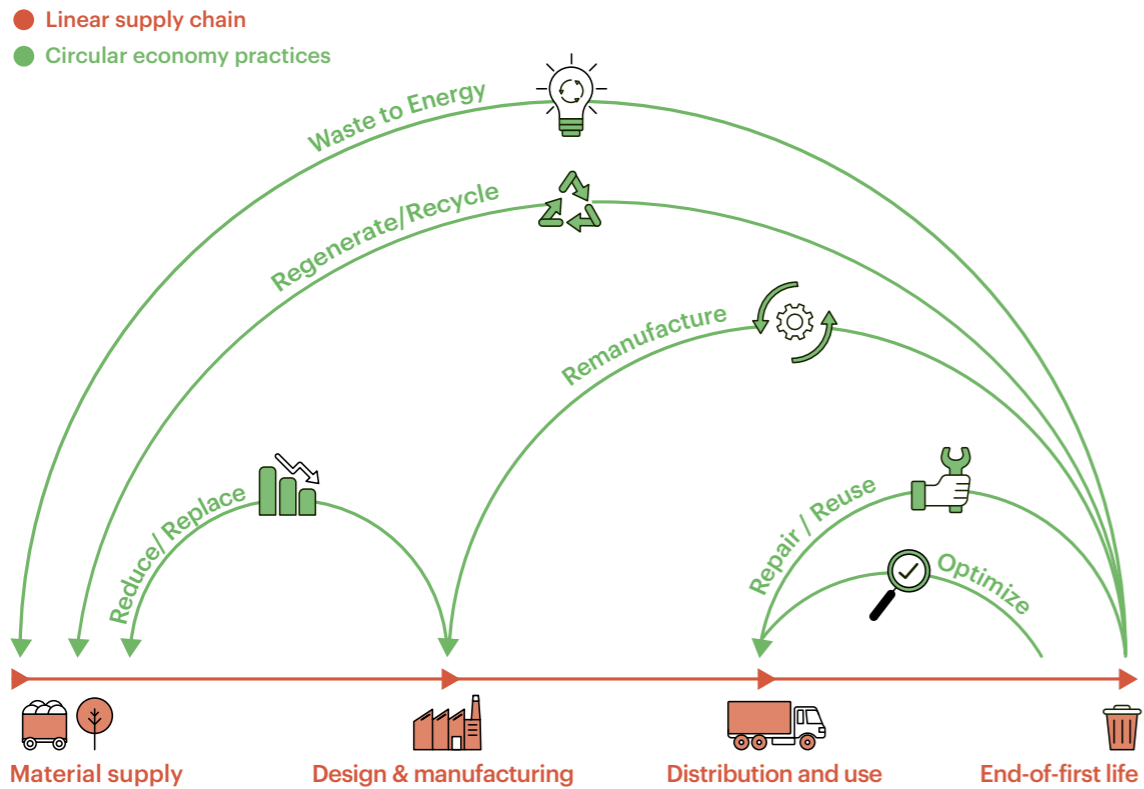
1. Direct support to the private sector
2. Creation of an enabling policy environment
3. Coordination, networking, and communication
4. Promotion of the Blue Economy in the region

Under the succeeding MED TEST III industry component, UNIDO aimed to advance greener and more circular business practices through technical assistance to industries. The projects were structured around two key pathways:

In Jordan, Lebanon, and Palestine, the objective was to demonstrate and strengthen capacities for RECP know-how and services. A total of 40 companies received support to assess and enhance resource efficiency using the UNIDO TEST methodology, resulting in reduced environmental footprint and operational costs. The project enhanced the skills and competence of local service providers through on-the-job training, preparing them to independently deliver RECP services in the future. This capacity-building effort sought to establish a sustainable market for RECP services while raising awareness among businesses and policymakers about more efficient production methods. RECP practices were also introduced into academic curricula to promote sustained adoption over time.

The second pathway was the focus on **circular value chains.** In Egypt, Morocco, and Tunisia, UNIDO promoted circular economy principles in the textile and garment sectors, identifying opportunities for improved chemical management and resource productivity, such as by-product valorization and improved recyclability. In Israel, the circular value chain approach





was applied to the plastics sector, where pilot demonstrations aimed to improve the recyclability of packaging and to support a regenerative economy by turning waste into valuable inputs for new production cycles.

Moreover, under the **SwitchMed Blue Economy component**, UNIDO extended circular economy principles to industries linked to aquatic and coastal ecosystems testing innovative technologies relevant to the local context. **In Morocco, pilot projects** were launched in the fish processing value chain, while **in Tunisia, one pilot project** focused on improving resource efficiency in the aquaculture sector.

The pilot projects under MED TEST III aimed to show how resource-efficient and circular economy principles—such as circular design, re-manufacturing, and recycling—can be introduced within specific value chains and product categories. Recommendations were formulated to address legislative and market barriers, with the goal of creating an enabling environment for incentivizing the uptake of more circular value chain opportunities through policy and market-based incentives.

By embracing resource-efficient and circular economy practices, businesses in

the neighbouring EU region can ensure their long-term viability in the face of new regulatory frameworks introduced under the EU Green Deal. These frameworks, such as the Eco-design for Sustainable Products Regulation (ESPR), the Extended Producer Responsibility (EPR) Directive, and the Carbon Border Adjustment Mechanism (CBAM), will profoundly impact the regional economy, making compliance with circular economy principles not just an environmental imperative but a business necessity.

Moreover, ongoing efforts to combat greenwashing will require businesses to demonstrate genuine sustainability efforts, reinforcing transparency and accountability in the marketplace. By integrating these directives into their strategies, companies can secure their operations for the long term, aligning with global trends while enhancing supply chain resilience. In this context, RECP is a foundational strategy for businesses to adapt, ensuring competitiveness and sustainability in a rapidly evolving regulatory landscape.

As industries transition to greater resource efficiency, these circular economy principles provide a pathway to bolster environmental and economic resilience—a critical approach that we will explore in the following sections.

The impact of resource efficiency on local manufacturing

Jordan, Lebanon and Palestine are grappling with serious environmental and economic challenges that demand innovative solutions. Severe water scarcity, high dependence on fossil fuels, escalating environmental degradation, and economic volatility threaten the region's long-term prosperity. In this context, a "business-as-usual" approach is no longer an option.

Building on a strong foundation: The SwitchMed Programme

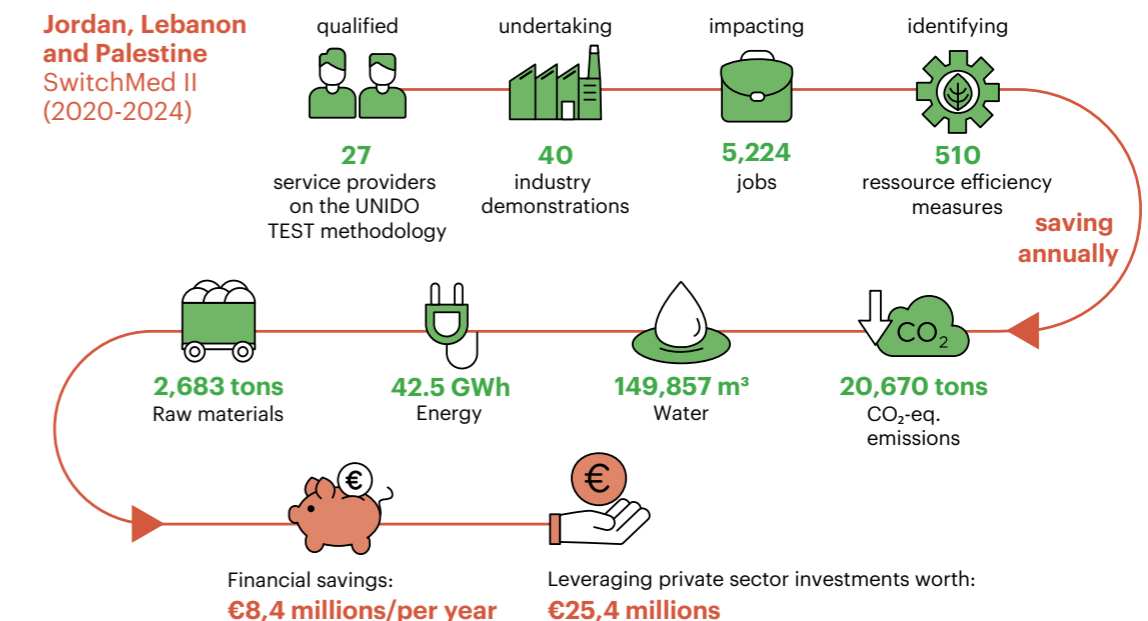
Building on the experience of the **MED TEST II project**, the **MED TEST III** set out to not only showcase the immense potential of RECP business models but also to equip local service providers to apply the **UNIDO TEST methodology** — a proven approach for assessing resource efficiency opportunities within industries.

To ensure the long-term sustainability of the SwitchMed intervention, UNIDO focused on building local capacities in Jordan, Lebanon, and Palestine. A total of **27 local service providers were trained in the TEST methodology**, equipping them with the skills

to help industries boost resource efficiency. UNIDO also partnered with **18 universities across the region** to integrate this approach into academic programs, fostering a new generation of professionals skilled in sustainable practices.

These efforts were reinforced through **40 company demonstrations**, during which trained service providers identified 510 resource-efficiency measures with a total investment potential of €25.4 million. The participating companies adopted 80% of these measures, offering a payback period of approximately two years. The identified resource-efficiency measures are projected to save **€8.4 million annually in production costs**.

Out of the **510 Resource Efficiency and Cleaner Production (RECP) measures** identified by the project team, the 40 companies are expected to collectively save 149,857 cubic meters of water, 42,500 megawatt-hours of energy, and 2,668 tons of raw materials. In addition, they could achieve a reduction of 20,670 tons of CO₂-equivalent emissions.

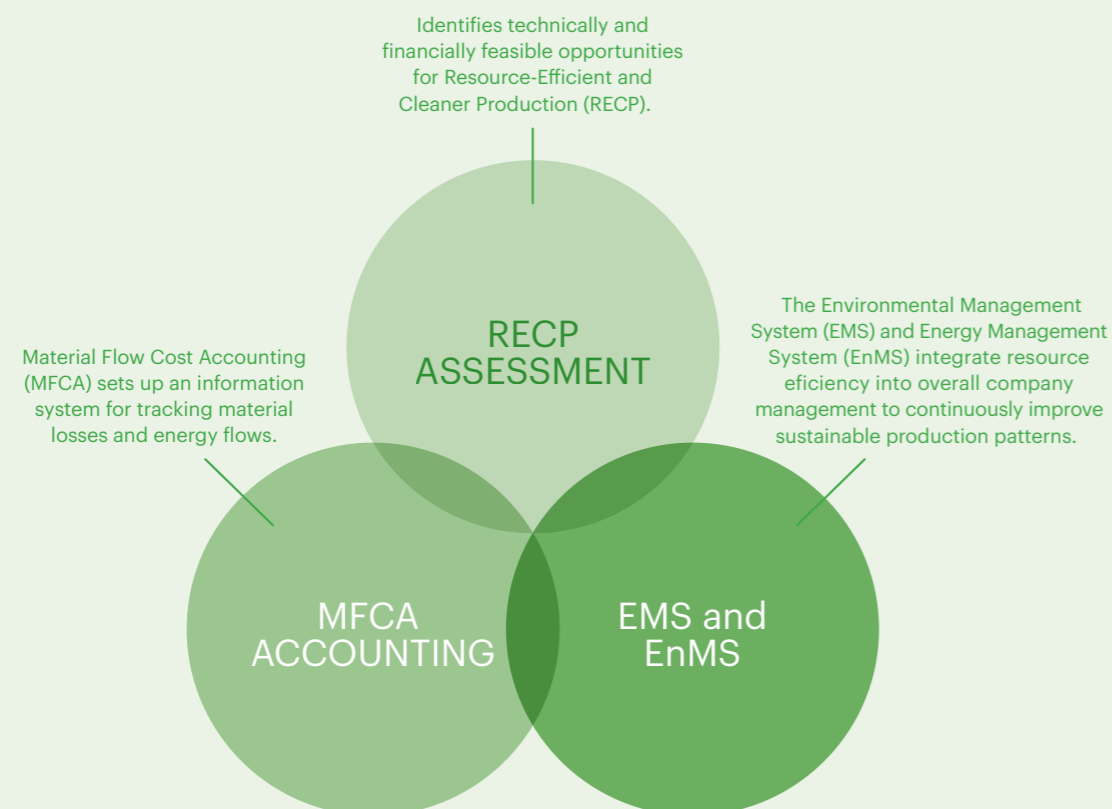


The TEST approach

Developed by UNIDO, the TEST methodology provides a systematic framework to help companies improve resource efficiency in materials, water, and energy use. It integrates tools such as Resource-Efficient and Cleaner Production assessment (RECP), Material Flow Cost Accounting (MFCA), and Environmental and Energy Management Systems (EMS/EnMS). These tools foster best practices, build new skills, and create an innovative management culture that enables a shift towards sustainable production models.

Central to TEST is the concept of the “learning organization,” where commitment from management and engagement from stakeholders, customers, suppliers, employees, are key. At the core of the TEST methodology is the RECP tool, which identifies financially viable solutions like operational controls, process modifications, and eco-innovative technologies. MFCA helps prioritize actions by analyzing the costs of non-product outputs and helping to establish information systems to track material and energy flows so as to be able to identify resource losses. It also measures economic gains from RECP actions informing decision making level of the company and ensures accountability.

EMS and EnMS elements are integrated to align resource efficiency with company-wide management practices. This provides clear guidelines and operational procedures that ensure sustainability efforts are maintained and advanced following a continuous improvement approach.



MED TEST III in Jordan

In the wake of global challenges, including the economic impacts of the COVID-19 pandemic, Jordanian industries have faced rising costs, supply chain disruptions, and increasing water scarcity. Against this backdrop, the MED TEST III project, implemented in cooperation with the Royal Scientific Society (RSS) of Jordan, has played a vital role in supporting cost-efficient production practices for Jordanian industries.

Focusing on key industrial sectors across **15 companies**—chemicals, food and beverage, and plastics—the MED TEST III project successfully demonstrated that resource-efficient practices can yield tangible business benefits. To achieve these outcomes, **MED TEST III trained over 20 local experts** on the TEST methodology, with eight service providers participating in the pilot industry demonstrations to gain an “on-the-job” experience. This hands-on approach enabled the local providers to implement RECP measures, supported by international experts who shared global benchmarks and knowledge.

Staff from the 15 participating companies were trained to implement these measures, helping to ensure the long-term sustainability of the initiatives. By engaging local personnel in identifying improvements, the project fostered a sense of ownership and empowered the companies to continuously advance their resource efficiency efforts.

As part of the project’s legacy, UNIDO assisted the RSS in designing an accreditation system for RECP service providers in Jordan. This system is currently being institutionalized in cooperation with the Technical and Vocational Skills Development Commission (TVSDC) and with the support of the German Agency for International Cooperation (GIZ). The system aims to ensure the long-term availability of qualified local experts¹.

Further to the private sector, the MED TEST III project has raised awareness of RECP in Jordan’s academic and financial institutions.

Professors from six universities received training on RECP tools, and by 2022, six institutions—including the Jordan University of Science and Technology (JUST) and five other universities in central and southern Jordan—had signed agreements to integrate RECP into their curricula. This initiative paves the way for future engineers to develop the skills needed to promote sustainability in the industrial sector.

“

After this project, our company has witnessed a remarkable improvement, such as reducing energy consumption and losses, improving public safety, increasing profit, refining quality, and optimizing the consumption of raw materials.

Mr. Rasmi Al-Mallah, CEO
Jordan Chemical Industries Company Limited (JCIC).

”

Looking ahead

The project’s success has contributed to policy development in Jordan, aligning RECP with national strategies for green growth and industrial competitiveness. Key achievements include:

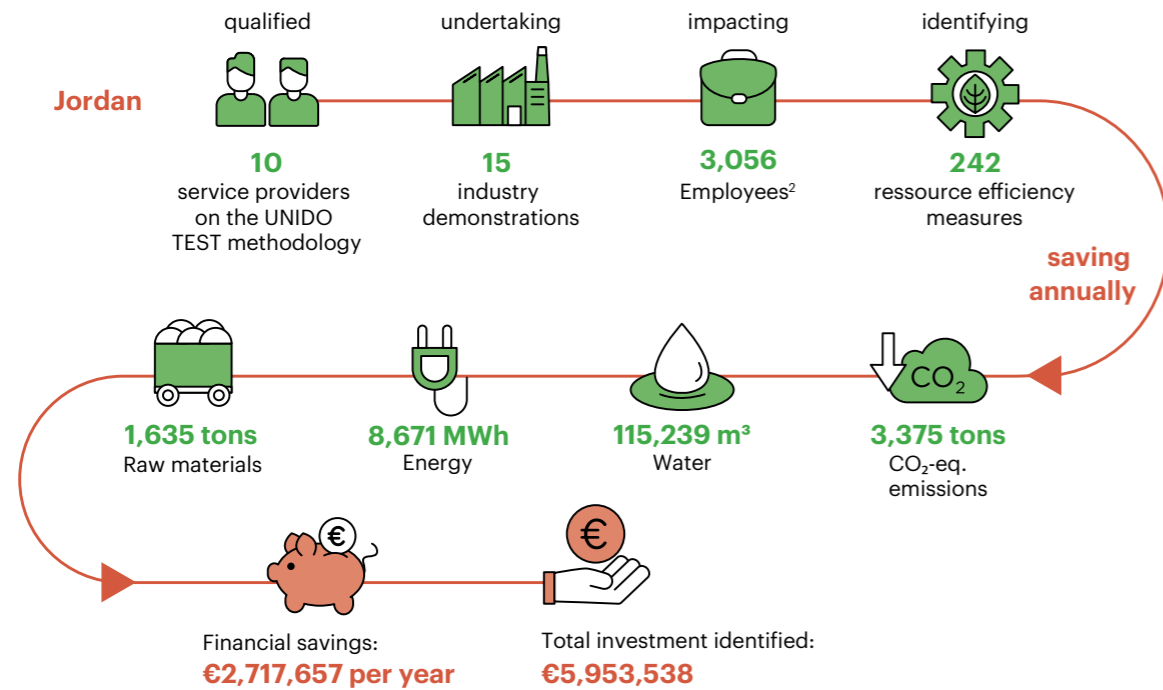
- The inclusion of RECP and the TEST methodology in the Green Growth National Action Plans 2021-2025.
- The integration of circular economy practices into Jordan’s new Economic Modernization Vision, with provisions for a national programme for resource efficiency, particularly in eco-industrial parks.

- The Ministry of Environment has reactivated the King Abdullah II Award for Excellence in Environmental Sustainability, with a focus on RECP in industry.
- The establishment of an Industrial Support and Development Fund by the Ministry of Industry, Trade, and Supply, supported by the World Bank, to provide grants for RECP measures.
- Synergies with GIZ’s “Green Action in Enterprises (GAIN)” project, which builds on MED TEST III outcomes.
- An EU-funded initiative to promote green innovations in the Azraq Refugee Camp and host communities through RECP in micro, small, and medium-sized enterprises.

Additionally, the EU’s “Support to Green Economy in Jordan 2021-2024” programme will leverage national capacities built during MED TEST III to implement 15 new integrated RECP practices and conduct 100 energy audits across Jordanian industries.

RSS, with UNIDO’s support, continues to work with national institutions and donors to scale up RECP initiatives. Key projects include:

- A grant agreement with the GIZ to design RECP tools tailored for micro and small enterprises in the food processing sector.
- A partnership with the Royal Academy of Engineering to digitize RECP monitoring using blockchain and IoT technologies at a SwitchMed food demonstration company, Al-Wadi.



¹ A list of accredited providers is available on the websites of the RSS and the Jordanian Chamber of Industry’s Energy and Environmental Sustainability Unit.
² Employees impacted refers to the total number of employees of the project’s beneficiary companies, calculated by the end of 2023. It indicates the workforce that is potentially influenced either directly or indirectly by the implementation of resource efficiency initiatives at the company, including aspects related to: job transformation, job creation, job reduction or realignment, skill development and cultural adaptation.



Scan the QR code to access the MED TEST III business cases implemented by UNIDO in Jordan’s industries:

Scan the QR code to access the project summary from the MED TEST III project in Jordan:

MED TEST III in Lebanon

Lebanon's industrial sector is struggling under the weight of an unstable political climate, financial instability within the banking sector and high inflation. Companies are grappling with power shortages, water scarcity, and difficulties in importing materials, all of which have significantly increased their operating costs. Given Lebanon's reliance on local production for food security, the food and beverage sector is especially critical.

To support these industries, the MED TEST III project has been instrumental in helping companies improve resource efficiency and adopt sustainable practices, thereby mitigating rising operational costs and reducing environmental impact. Through technical assistance, **18 companies** from the food, beverages, chemicals, plastics, and printing sectors were introduced to the TEST methodology, which enabled them to strengthen their efficiency and resilience.

One of the project's standout achievements was the whey valorization initiative, developed in partnership with two Lebanese dairy companies and two universities. The project developed innovative, whey-based products such as fruit juices, Ayran, and spreadable cheese based on whey, a by-product from the cheese production that often is wasted causing significant wastewater pollution. Developed with minimal investment and energy consumption, these products could offer affordable and nutritious food options for Lebanese families while helping SMEs in the dairy sector reduce their waste. Notably, one of these whey-based products has already entered the Lebanese market and the initiative has expanded, with additional companies expressing interest in whey valorization solutions.

Capacity-building efforts played a key role in the project. Students and technical assistants from the Lebanese University were trained in sensory analysis, data collection,

and processing. Additionally, five master's degree students were involved in the whey valorization pilots, contributing research based on their practical experience, while one student conducted a market study.

Additionally, a pre-feasibility study was carried out to explore setting up a bottle-to-bottle PET recycling plant in Lebanon after one of the demonstration companies, the plastics producer PETCO, expressed interest. The study estimated that an investment of **€9.2 to €14.7 million** would be needed to recycle about one-fourth of Lebanon's PET waste by 2030.

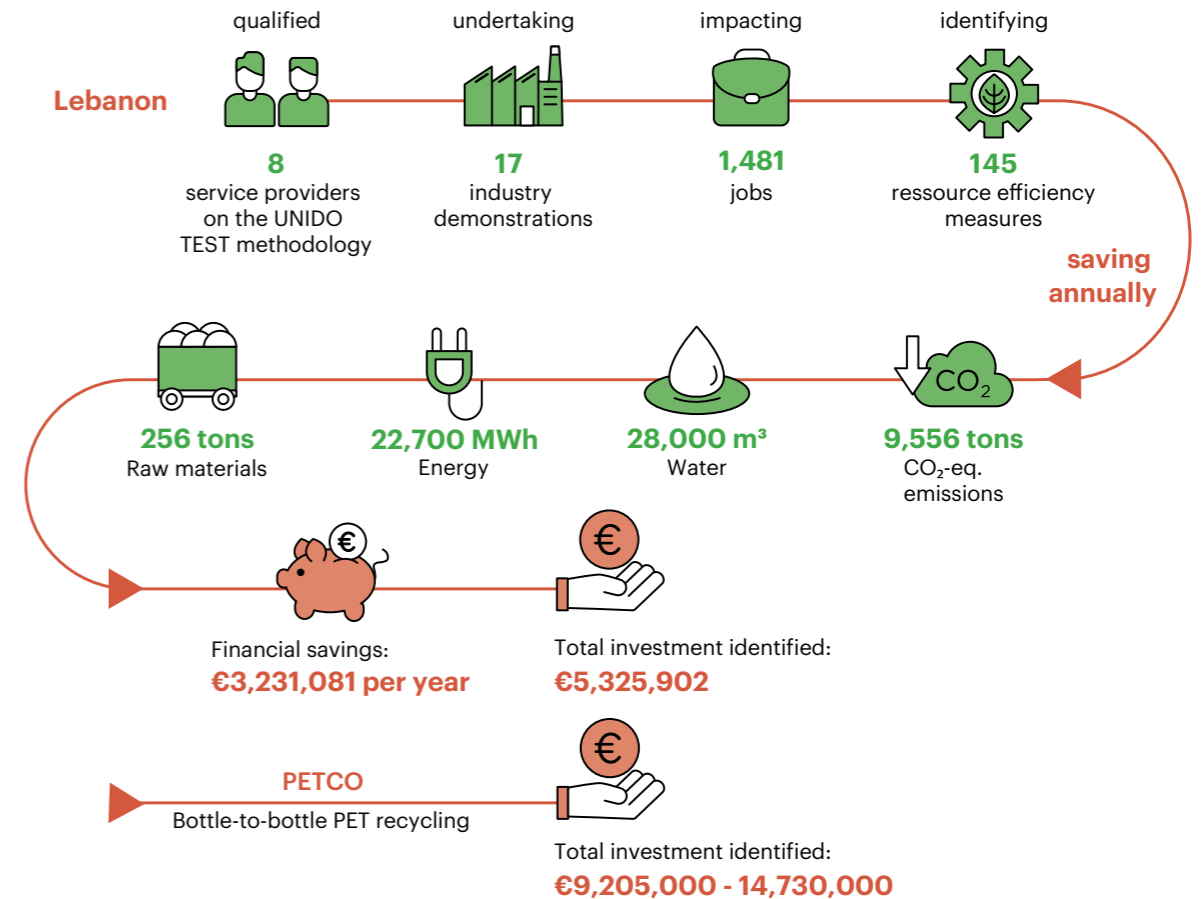
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Our collaboration with the MED TEST III project has been transformative. The initiatives have not only reduced our operational costs significantly but also strengthened our commitment to sustainable practices, benefiting both our business and the environment.

Mr. Fouad Haddad,
CEO, Liban Lait s.a.l.

”

In Lebanon, the MED TEST III project also developed a national road map for introducing RECP into the development of industrial parks; the road map includes several recommendations for transforming existing and future industrial areas based on green economy principles.



Looking ahead

The MED TEST III project has helped establish a market for service providers in resource efficiency. Building on previous efforts, which trained 27 experts, an additional group of experts was also trained, expanding the available expertise for future initiatives. This expertise will support the EU-funded '2Circular' project, implemented by UNIDO from 2023-2025 with a budget of €3.7 million.

Amid Lebanon's ongoing socio-economic challenges, there has been a growing recognition of the importance of resource efficiency. Many companies are adopting these

practices not only as a means to reduce costs but also as a way to build resilience and maintain competitiveness in an increasingly difficult business environment. The MED TEST III project, along with the 2Circular initiative, is contributing to this effort by providing vital support to more companies, helping them adopt sustainable practices that can mitigate the impacts of the crisis and ensure long-term sustainability.

As a continuation of MED TEST III, the 2Circular project will scale-up the application of RECP in Lebanon's industry and aims to support 50 more companies by promoting circular business models and helping SMEs access financing for green projects.

Scan the QR code to access the MED TEST III business cases implemented by UNIDO in Lebanon's industries:



Scan the QR code to access the project summary from the MED TEST III project in Lebanon:



MED TEST III in Palestine

Palestine faces ongoing economic challenges, including high unemployment, restricted trade, and limited access to resources, all of which have been exacerbated by the region's political instability. These constraints have slowed the growth of its industrial sector. In response, the MED TEST III project has promoted resource efficiency to support sustainable industrial development in Palestine.

Building on the achievements of the MED TEST II project, which successfully introduced RECP practices to 10 food companies, the MED TEST III project expanded these initiatives to **seven additional companies** across the food and beverage, plastics, pharmaceutical, and paper sectors. Implemented in partnership with the Ministry of National Economy (MoNE), the Environmental Quality Authority (EQA), and key industry bodies such as the Palestinian Federation of Industry, MED TEST III aimed to broaden the impact of RECP practices across diverse sectors, enhancing sustainability and operational efficiency.

A significant aspect of the project involved the training of **10 local service providers** who gained practical experience by assisting companies under the guidance of international experts. In addition, the project further extended TEST training to company staff, ensuring that improvements are sustained and that businesses take ownership of efficiency measures. This capacity-building effort has contributed to developing a qualified pool of service providers in Palestine, further supporting resource efficiency efforts across industries.

Beyond its direct impact on industry, MED TEST III fostered important collaborations between academic institutions and the private sector. An-Najah National University and Al-Quds University have integrated resource efficiency courses into their curricula, ensuring that young engineers are equipped with the knowledge necessary for sustainable industrial practices.

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The successful implementation of the UNIDO TEST methodology in our member's industrial food firms has resulted in remarkable improvement and impactful transformations. It has addressed some of our most critical challenges, including scarcity of vital resources such as materials, energy, and water.

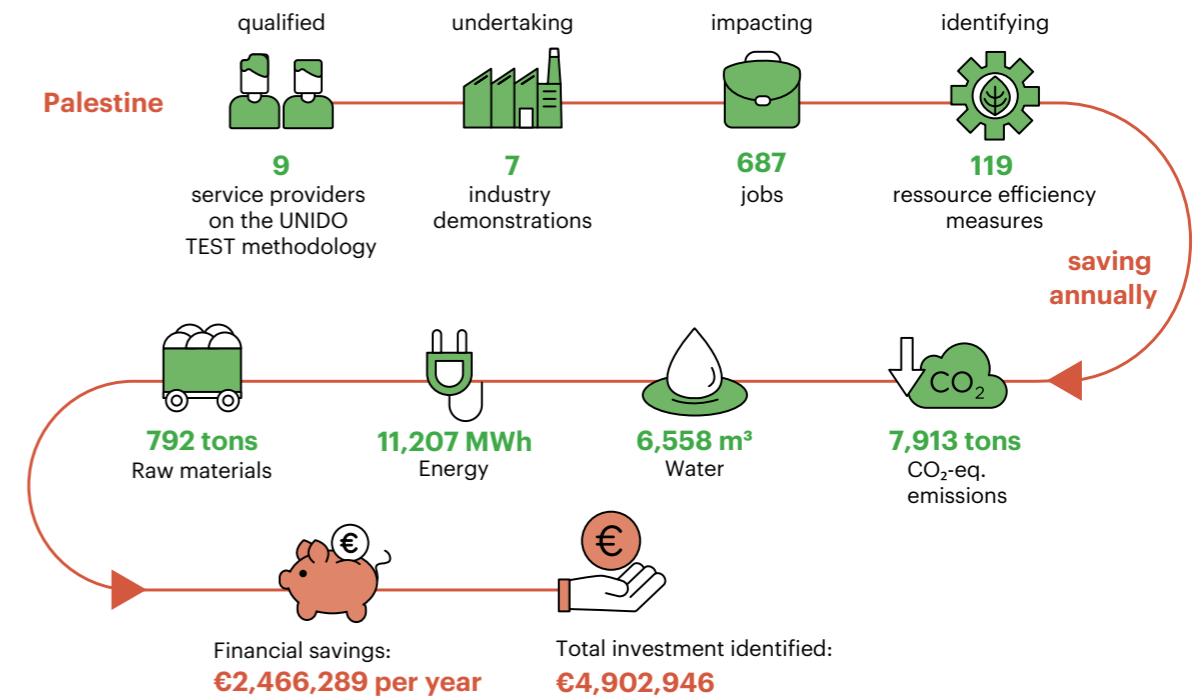
Bassam Abu Ghalyoun
General Manager, Palestinian Food and Agriculture Industries Union – PFAIU

”

Looking ahead

The project also recognized the crucial role of financial institutions in supporting resource efficiency investments. By engaging banks through awareness raising and training activities on the benefits of resource efficiency, MED TEST III has created favourable conditions to enhance access to finance for companies seeking to implement these practices. Several banks now see how RECP helps companies reduce costs and improve their financial risk profiles, making resource efficiency projects more attractive for funding.

The progress made under MED TEST III has spurred the government and local stakeholders to further expand the national Roadmap for Scaling Up Resource Efficiency, first developed during MED TEST II. Momentum is growing as initiatives like the “Go Green Palestine” program, which promotes sustainable environmental practices across sectors, demonstrate a stronger commitment to sustainable development.



Establishing a Green Industries Department and a Supreme National Committee for Industrial Development, alongside the newly established Ministry of Industry further signals Palestine's dedication to transitioning toward a greener economy. These efforts have been pursued amid significant disruptions caused by the ongoing conflict,

reflecting the resilience and determination of Palestinian stakeholders to advance towards a more sustainable and competitive future.

Scan the QR code to access the MED TEST III business cases implemented by UNIDO in Palestine's industries:



Scan the QR code to access the project summary from the MED TEST III project in Palestine:



Advancing circularity in the textile and clothing sector

The textile industry has shaped human civilization for centuries, but its modern growth has come at a cost. What began with hand-spun fibers and artisanal craftsmanship has evolved into a \$2.4 trillion global economic force, employing over 300 million people (source: World Bank). However, particularly through fast fashion, this growth has come with significant environmental challenges. Over the last 15 years, clothing production has doubled, intensifying both environmental and economic impacts.

Given its considerable environmental footprint, the textile industry presents a strong opportunity for sustainable interventions that can generate substantial environmental benefits. The southern Mediterranean region is a significant player in global textile production. Renowned for its high-quality manufacturing and strategic location, it serves as a key hub for European, Middle Eastern, and North African markets.

“
Thanks to the UNIDO project, we have new tools to show our ZDHC commitment to brands, such as ZDHC Training Certificates, Supplier to Zero Certificate (Foundational level) and ZDHC Clearstream. We made a step forward to improve and build existing and new customer relationships, which is key to building our future.
 ”

Khalid Kairouch, Production Manager, EVLOX (Morocco)



SwitchMed’s dual approach: Advancing safer chemical management and circular economy business models

A key aspect of circularity within the textile and clothing value chain involves valorizing post-industrial textile waste—reclaiming and repurposing excess materials generated during manufacturing. However, for such practices to be effective, eliminating hazardous chemicals from production cycles is essential. By ensuring the use of safe, sustainable chemicals in production, the textile industry can enhance the quality of recycled materials, extend their life cycle, and fully adopt the principles of a circular economy.

Improving chemical management: The impact of ZDHC Guidelines in the Mediterranean textile industry

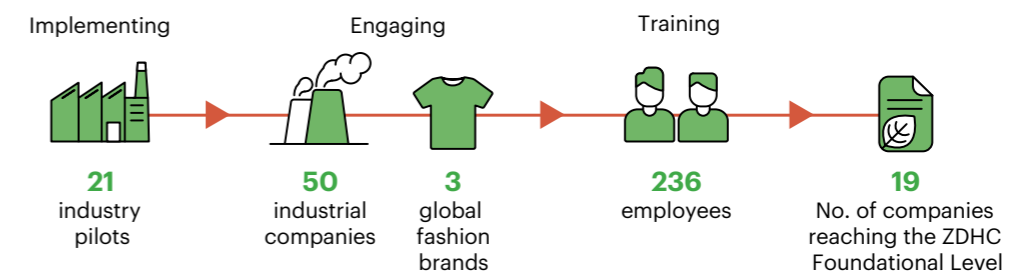
The textile industry heavily relies on various chemicals during dyeing, washing, and finishing processes. These chemicals adversely impact the environment by contaminating water sources, contributing to air pollution, and causing soil contamination from improper waste disposal. Additionally, workers face health risks, including respiratory issues and skin diseases, making the need for improved chemical management urgent.

In response to the growing concerns about the environmental and health impacts of hazardous chemicals used in the global textile,

leather, and footwear industries, the Zero Discharge Hazardous Chemical Foundation (ZDHC) was founded by stakeholders from the fashion and chemical industry to phase out hazardous substances used in the production of textiles, clothing, and footwear. In SwitchMed, UNIDO collaborated with the ZDHC helping companies to implement chemical management systems and safer alternatives to hazardous chemicals in compliance with global sustainability standards.

UNIDO supported 50 companies and trained 236 employees in applying ZDHC Guidelines for safer chemicals across **Egypt, Morocco, and Tunisia**, focusing on small to medium-sized enterprises along the textile value chain. Of these, 21 companies received tailored technical assistance to enhance chemical management to reach the ZDHC Foundational Level. By the project’s end, 40% of the companies reached this milestone, collectively improving hazardous chemical substitution, storage, wastewater management, and staff training.

The success of these pilot projects has shown the potential for scalable sustainable practices within the textile and clothing industry, paving the way for a cleaner, safer, and more competitive textile industry in the Mediterranean. National roadmaps for scaling-up have been designed in consultation with local stakeholders, outlining specific actions, timelines, and strategic guidance for promoting sustainable chemical practices in each of the three countries.



Scan the QR code to access the MED TEST III business cases for adopting safer chemical management practices in the textile and clothing industry:



Circular business models for pre-consumer textile waste

The textile and clothing industry generates a large amount of pre-consumer textile waste, which includes leftover fabrics and production scraps, defective garments, and unsold inventory that never makes it to consumers.

As part of the MED TEST III project, UNIDO demonstrated innovative circular business models to valorize pre-consumer textile waste within the textile or non-woven value chains. Pilot projects unveiled new business opportunities for countries in the southern Mediterranean region to become producers of recycled textile fibers, which are in high demand, particularly within the fashion industry.

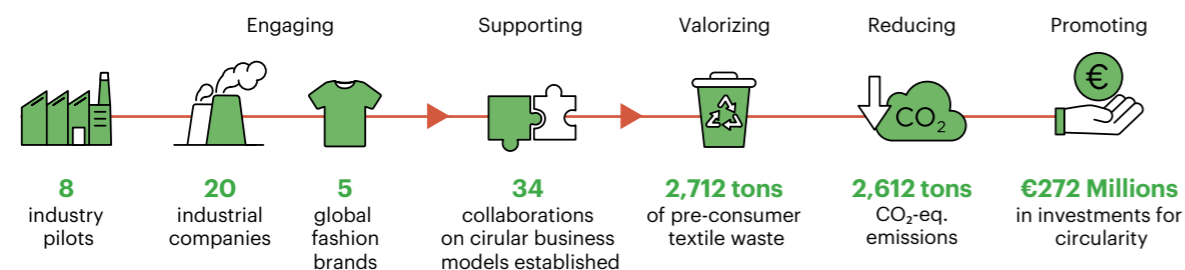
An initial waste mapping survey in **Egypt, Morocco, and Tunisia** revealed that the textile and clothing sector generates about **326,000 tons** of pre-consumer textile waste annually, with at least 50% consisting of high-quality cotton-rich materials. Textile waste holds minimal value and cannot be easily reintroduced into production cycles until it is segregated by fiber composition and colour. Therefore, a primary objective of the project was to raise awareness and train a group of textile and clothing manufacturers in waste segregation protocols to better facilitate recycling.

A second objective focused on stimulating the creation of localized recycling value chains by promoting investment opportunities, encouraging technological modernization, and expanding existing recycling capacities.

UNIDO collaborated with over **26 value chain actors** and **three global fashion brands** to launch eight pilot projects across the three countries, demonstrating how circular textile business models can create new job opportunities and reduce the industry's carbon footprint.

Egypt

Egypt's textile and clothing sector produces approximately 212,000 tons of pre-consumer textile waste annually, with 57% consisting of pure cotton or cotton-rich materials. Although the country already has some recycling units, these facilities primarily process imported textile waste. Enhancing local waste-handling practices is essential to allow recyclers to source the textile waste locally instead of importing it, creating the necessary conditions for new investments in recycling capacities.



UNIDO implemented two pilot projects, achieving the following results:

- Quality waste collection hub:** The project trained **11 textile producers and three recycling companies** on effective waste management protocols and digital platforms for waste tracking. This initiative led to improved waste segregation at the source, higher revenues for garment makers selling their waste, more local waste available for recycling, and enhanced market transparency. Over the course of the one-year pilot, a total of **2,400 tons of pre-consumer textile waste** were collected and segregated for further recycling, representing approximately 1% of the country's annual pre-consumption waste generation.
- Modernization of recycling capacities:** A pre-feasibility analysis and comprehensive business plan were developed to evaluate various technological solutions. Additionally, promotional activities were conducted, including a study tour and a B2B event to connect technology providers and facilitate matchmaking. By assessing the technical limitations and market dynamics, the project identified investment opportunities ranging valued at **€230 million** focusing on advanced chemical and mechanical recycling technologies. These improvements could lead to the production of **30,000 tons of recycled fiber annually** from Egypt's textile waste.

Morocco

In Morocco, the project demonstrated a viable business model for establishing a local recycling hub for high-quality recycled yarns, identified new markets for utilizing textile waste in non-woven applications, and created local capacities in circular design:

- High-value recycling:** Collaborating with a leading Moroccan vertically integrated spinner and denim fabric producer, this pilot focused on transferring knowledge on improving the spinning of yarns with recycled content, expanding the recycling capacity of high-quality cotton waste for new fabric production. The project established partnerships with five garment

producers to properly collect and sort their pre-consumer textile waste and **collected 160 tons of cotton waste**, enough to produce over **1.2 million meters of denim fabric**. The company has finalized a business plan for a future **investment of approximately €1.5 million** in a new mechanical recycling line.

- Industrial symbiosis:** In collaboration with a company operating in the Moroccan non-woven sector, the project explored the potential of using lower-grade textile waste to produce insulation boards for the construction sector. Morocco recently passed a new green building law that is expected to significantly increase demand for insulation boards, which are currently imported rather than produced locally. The feasibility of producing cost-competitive insulation boards from textile waste, thereby valorizing waste that cannot be recycled back into textiles, was successfully demonstrated.
- Circular fashion design:** In partnership with the **Casa Moda Academy in Casablanca**, the project introduced circular design practices to fashion design students, inspiring them to create sustainable clothing from post-industrial waste. The initiative culminated in a capsule collection produced by the students of Casa Moda that was showcased with a photographic exhibition at the **White Show in Milan in 2024**, highlighting the potential for integrating circular design into mainstream fashion.

Tunisia

In Tunisia, the project collaborated with three international brands, OTB-DIESEL, Nudie Jeans and the PVH Group (Calvin Klein, Tommy Hilfiger), to demonstrate a circular closed-loop business model to recover cutting waste and dead stock products back into the production of new garments and jeans.

- **Deadstock to new jeans:** A collaboration with the Swedish denim brand “Nudie Jeans” and their Tunisian supplier, demonstrated the business case for recycling second-quality jeans into new denim products. **This initiative led to the production of 96,000 pairs of jeans with 20% recycled content from 40,000 pairs of second-quality jeans**, significantly reducing waste and creating new market opportunities.
- **Empowering local suppliers:** Collaborating closely with a leading Tunisian denim producer, the WIC-MIC group, the project improved waste segregation, collecting 19 tons of high-quality textile waste that was used to **produce 112,000 meters of denim fabric made with 20% recycled cotton**. This initiative drew the interest of one of their clients, the PVH Group, leading to an order of 40,000 pairs of jeans for the Fall/Winter 2024 collection for one of its brands, Calvin Klein. This success demonstrates how a bottom-up approach to circular business models can drive tangible demand within the textile value chain, underscoring its potential to influence larger market trends.

- **Closed loop recycling of denim cutting waste:**

This project collaborated with Italian denim brand **DIESEL** to establish a local recycling value chain for denim waste in Tunisia. By working with a Tunisian garment manufacturer and a local spinning and weaving company, **7.5 tons of segregated denim waste** were recycled into **46,000 meters of new denim fabric**, with at least **20% recycled content**. This fabric was used to produce **28,000 pairs of jeans** for DIESEL’s Fall/Winter 2023 collection. DIESEL committed to continuing the initiative, aiming to recycle an additional **16.3 tons** of waste by 2024. This initiative also reduced 35.4 tons of CO₂ emissions, demonstrating the environmental and economic benefits of circular business models. Additionally, the project tested the recycling of lower-quality cutting scraps by engaging and building the capacity of a local recycler and producer of non-woven materials. In recognition of its involvement in this pilot initiative, DIESEL received the **Circular Economy Award** presented by the Ellen MacArthur Foundation as part of the 2024 Sustainable Fashion Awards from **Camera Nazionale della Moda Italiana**.



Scan the QR code to access the MED TEST III business cases for adopting circular business models in the textile and clothing industry:



Transforming Israel's plastic value chain

The Organization for Economic Cooperation and Development (OECD) ranks Israel as one of the leading consumers of single-use plastics. Currently, 80% of its waste ends up in landfills, with only 7% being recycled and 1% incinerated for energy recovery.

The plastic packaging sector alone generates over 200,000 tons of waste annually. Although materials like Polypropylene (PP) and Polyethylene Terephthalate (PET) are recyclable, the lack of adequate recycling facilities and improper packaging design choices mean much of this waste is lost as a valuable resource. A 2019 survey conducted by UNIDO found that while plastic converters were willing to use recycled resins, lack of standards and limited local supply made it difficult to adopt these practices.

The current situation not only harms the environment but also represents a significant economic loss. Israel is now looking for new ways to manage their plastic waste more effectively and mitigate its environmental impact. In response, UNIDO collaborated with the Israeli government, NGOs, and industry stakeholders. The aim was to promote circular business models in the plastic value chain and to identify opportunities to increase the quality and quantity of sorted plastic waste streams. This initiative will eventually boost the capacities of Israel's recycling industry to handle larger volumes of post-consumer plastic waste and offer more sustainable packaging solutions. The project focused on two main areas: improving regulatory frameworks and engaging the private sector in implementing circular business models on a pilot scale.

Key outcomes of the initiative included policy recommendations to develop national standards for recycled plastics, alongside amendments to green building standards that incentivize the use of recycled plastic materials.

The Standards Institution of Israel (SII) has already **adopted three standards, with an additional eight standards budgeted for adoption.** Updates on **green public procurement** practices were also introduced to stimulate demand for products with recycled plastic content. A pre-feasibility study for a bottle-to-bottle PET recycling plant offered detailed insights into ownership models, technological processes, and economic considerations. Following these recommendations, **two rPET recycling facilities have been commissioned in Israel,** ensuring that PET waste can be recycled and reprocessed as rPET resins in Israel.

At Osem-Nestlé, we have set goals that by 2025, all our packaging will be recyclable.

Amit Ron,
Packaging Manager, Osem-Nestlé.

In 2021, the launch of an interactive tool for designing sustainable packaging further amplified the project's impact. This tool enables manufacturers to assess and improve the recyclability of their packaging, reinforcing SwitchMed's role in driving industry-wide change. Modifying plastic packaging design is a crucial step to improving the recycling rate for plastic packaging in Israel.

In 2022, three pilot projects were launched to showcase the potential of circular business models in the agricultural sector and consumer packaging.

Transforming greenhouse plastic waste into recyclates

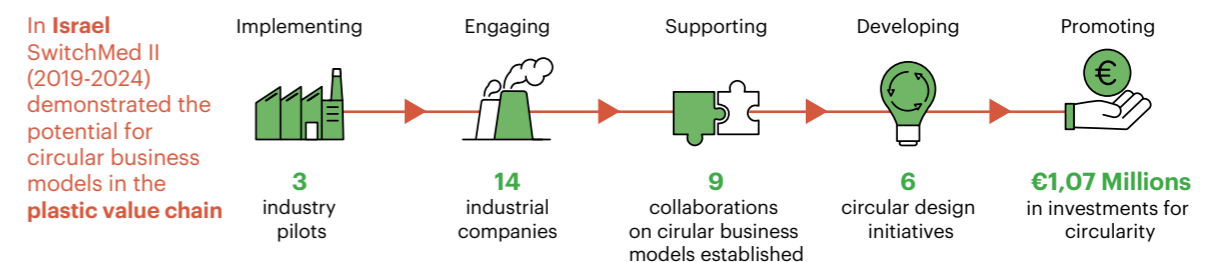
The plastic film that is used to cover greenhouses poses significant environmental challenges, with approximately 6,250 tons of plastic film waste discarded annually through incineration, landfills, or improper disposal. To tackle this issue, UNIDO collaborated with local farmers to test an innovative collection method that minimizes soil contamination during plastic film removal—historically a major barrier to recycling. By rolling the films onto irrigation pipe drums, the plastic remains clean, and it can be recycled more easily. The collected films are transformed into recyclates that meet quality standards for semi-transparent plastic, which enables their sale to the electric and infrastructure piping sector. Based on the pilot's results, plans to expand the program for collecting and recycling greenhouse plastic films are now in progress.

Recycling of flexible packaging

Only a small fraction of the consumer plastic packaging is recycled in Israel. Challenges include the widespread use of multi-material packaging, which is difficult to identify, sort, and recycle—often resulting in incineration. Additionally, flexible packaging smaller than A4, even if composed of a single material, cannot be automatically sorted by existing waste technology, and is often sent to waste-to-energy facilities. Only packaging that meets specific size and composition criteria is sorted for recycling. The project explored how PP and high-density polyethylene (HDPE) recyclates could be integrated into the production of non-food-grade rigid packaging. Collaborating with the

Flexible packaging offers environmental benefits due to its lightweight nature, reducing the use of packaging materials. However, it presents a challenge in terms of sorting and recycling. The pilot demonstrated the feasibility of closing the loop even in such a challenging waste stream, thanks to dialogue and collaboration among all stakeholders in the value chain, including policymakers.

Ohad Carni, SwitchMed Focal Point,
Ministry of Environmental Protection





Circular packaging by design

Engaging leading food and beverage national brands and their local supply chain, UNIDO demonstrated how the redesign of food-contact packaging to enable its recyclability is technically and economically feasible. A pilot project was conducted on three different types of packaging: a yogurt cup, a salad container, and a plastic bottle, each with a sleeve made from a different type of plastic than the main body. The combination of different plastics in the packaging hindered proper sorting and recycling. To address this issue, the sleeve was replaced with a compatible material, allowing proper identification at sorting facilities. This redesign significantly improved efficiency, achieving a **49% reduction in carbon footprint, a 60% decrease in fossil resource use, and an 84% reduction in mineral and metal resource use.** The sleeve and packaging manufacturers who took part in the project, jointly applied to the **Israel Star competition in 2024** and won first place with the redesigned PP-cup.

The success of the pilot projects has highlighted the potential for converting previously non-sortable packaging into recyclable materials, promoting a more sustainable approach within Israel's plastic value chain. Participation from major food and beverage brands underscores a growing commitment to designing for recyclability, encouraging ongoing efforts to incorporate circular design strategies. To sustain this momentum, it is essential to develop policies that incentivize manufacturers to adopt recyclable packaging, along with introducing new handling fees and eco-modulation fees to drive sustainability in packaging practices.

Scan the QR code to access the MED TEST III business cases for circular business models in Israel's plastic value chain:



Promoting the blue economy in the Mediterranean

The blue economy aims to sustainably transform maritime economic activities, such as fishing and aquaculture, while minimizing impacts on marine and coastal ecosystems. The goal is to enhance food security, create jobs, and support the livelihoods of coastal communities, all while preserving essential marine resources.

Within the SwitchMed project's blue economy component, UNIDO has introduced sustainable practices, proposed policy recommendations, and presented eco-innovative business models in key marine sectors in Morocco and Tunisia.

Following a comprehensive value chain mapping, UNIDO identified key priorities and implemented three pilot projects to reduce environmental impact while increasing profitability and resilience in Morocco's fish processing industry and Tunisia's aquaculture sector.

Morocco

Demonstrating resource-efficiency and valorizing business models in the canning and freezing fish processing units

Morocco's fish processing sector is vital to the economy, providing jobs and export revenues. However, it faces challenges such as overfishing, marine pollution, and inefficient resource use. UNIDO led two pilot projects that demonstrated the significant potential for growth in both economic and environmental benefits if scaled up across Morocco's fish processing sector.

The first pilot project took place at Complex Industriel Belhassan (CIBEL), a vertically integrated fish processing company in Agadir, and with the support of the National Institute of Fishery Research (INRH), the Moroccan Federation of Seafood Processing and Valorization Industries (FENIP), and several national institutions. These projects focused

on improving resource efficiency and fostering industrial symbiosis across CIBEL's fish canning, fishmeal, fish oil, and freezing divisions.

CIBEL has committed to implementing over 80% of the identified efficiency measures at its new facilities, demonstrating the project's positive impact on resource efficiency and by-product utilization.

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The SwitchMed Blue Economy project has demonstrated the opportunities for energy savings, the development of new products, and the sustainable use of our marine resources for better development of the circular economy and the blue bioeconomy.

Sara El Baissi,
CEO, CIBEL

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With over 60 canneries, 200 freezing units, and 25 fishmeal factories, scaling up the demonstration projects could enhance both economic growth and environmental sustainability.

Through eight online modules, around 350 professionals from the fish processing sector received training on resource efficiency and circular economy best practices. Additionally, a road map with policy recommendations to support sustainable fish processing nationwide was developed by UNIDO and stakeholders from the project.

The road map includes six objectives focused on policy tools, financing, training, awareness, and capacity-building, along with 13 actions, each with specific performance indicators, stakeholders, and an implementation plan. This strategy aims to support the National Development Strategy 2030 and align with the Halieutis 2020-2030 national strategy.

Valorizing fish processing by-products

Morocco generates substantial volumes of fish by-products. A detailed mapping of the fish processing value chain revealed that up to 40-50% of small pelagic fish are discarded during industrial processing, much of which is currently directed toward the production of fish meal and fish oil. Consequently, the second pilot explored alternative valorization routes for fish by-products from CIBEL, turning waste into high-value products like proteins, oils, and minerals for new market applications.

Lab and industry-scale trials were implemented in collaboration with INRH and CIBEL factory to test three different

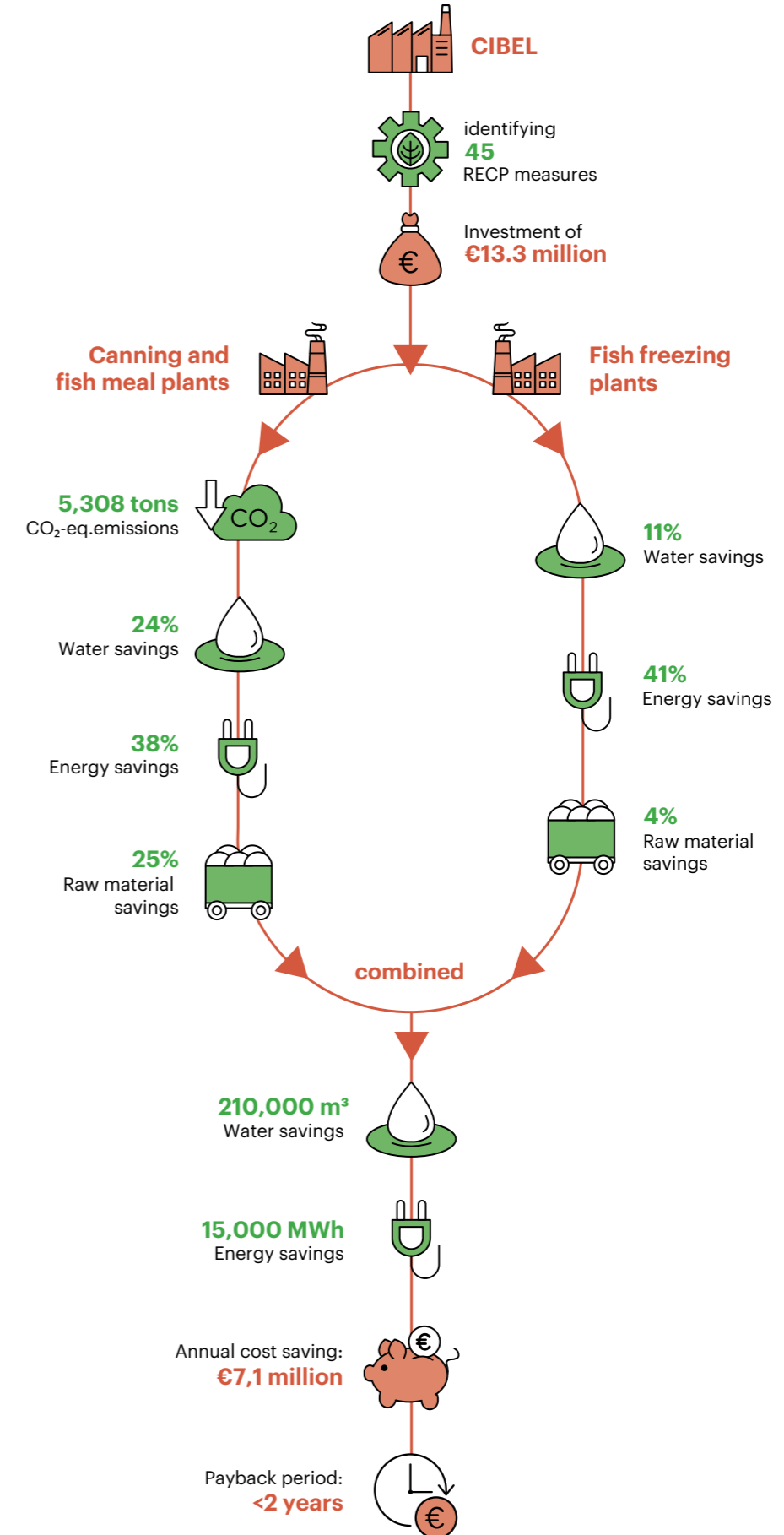
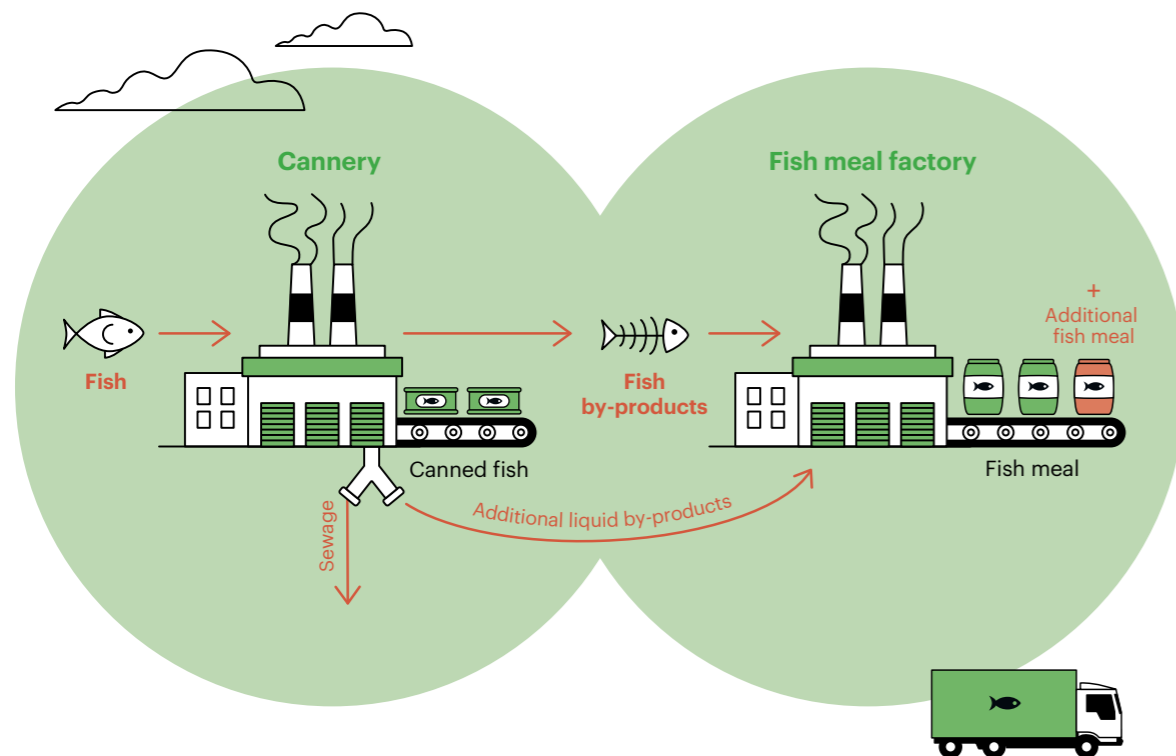
valorization routes: using fish collars for food products, using viscera to produce hydrolysates containing 85% protein, and extracting collagen from fish scales and skin. Food applications alone could generate an annual **turnover exceeding €800,000**, with payback achievable within six months. By repurposing fish by-products, the project helped reduce waste and improve resource efficiency.

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Valorizing pelagic by-products can significantly enhance profitability and sustainability in Morocco's fish processing industry, tapping into high-revenue markets and supporting the blue bioeconomy.

Mariem Kharroubi, Biotechnology Research Director and Head of INRH - Valorization Center

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Tunisia:

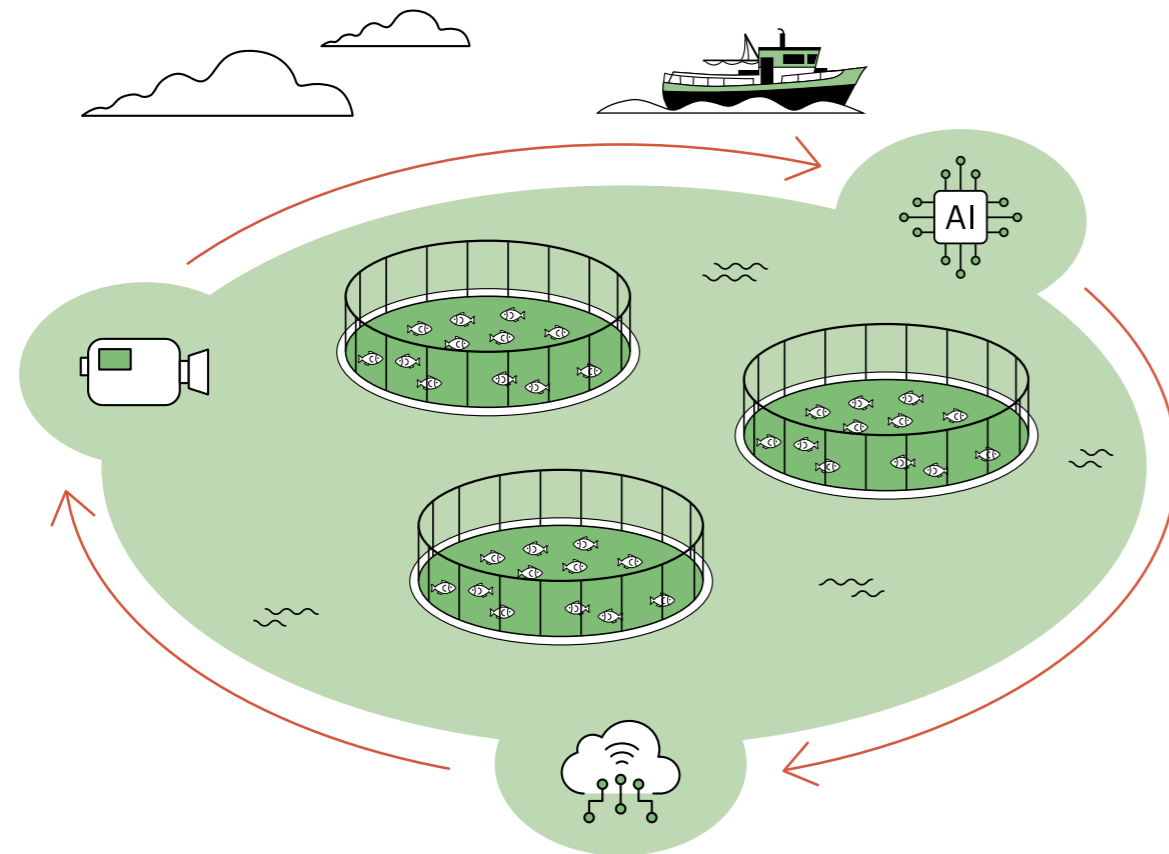
Promoting RECP in Tunisia's aquaculture

Tunisia's aquaculture contributes TND 2 billion (€0.63 billion) to the national GDP and is a rapidly growing sector. However, high operational costs and inefficient feeding practices present major challenges. UNIDO in collaboration with the National Institute of Sea Sciences and Technologies (INSTM) aimed to optimize production performance and reduce environmental impacts by demonstrating eco-innovative technologies, such as underwater cameras, artificial intelligence (AI), and Internet-of-Things (IoT) solutions, at a demonstration facility in Tunisia.

In addition, the project also enhanced the capacities of value chain actors by providing training on the economic and environmental benefits of these technologies. The project also developed an **eight-module curriculum**, engaging over **480 participants**

“*Integrating eco-innovative technologies into the Tunisian aquaculture sector is crucial for enhancing its economic performance while preserving the marine environment, thus ensuring the transition to a more sustainable and resilient production model for the future.*”

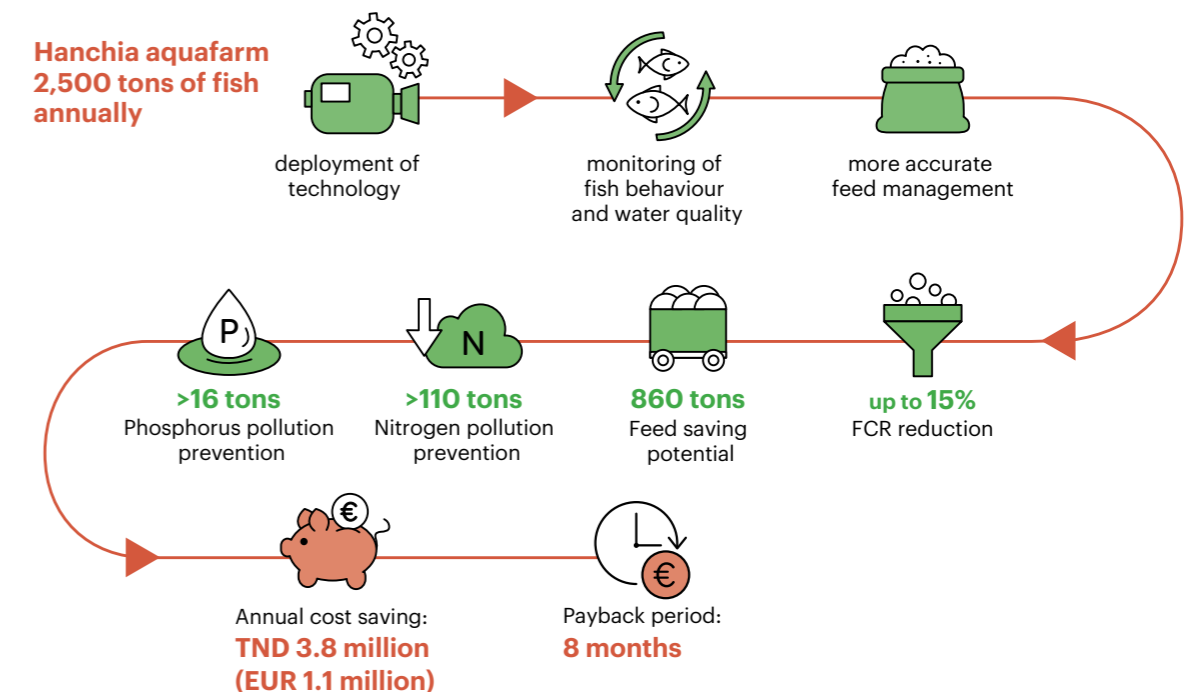
Prof. Dr. Azaza Mohamed Salah,
Senior Research Scientist and Director of the Aquaculture Laboratory, INSTM



Promoting RECP in Tunisia's aquaculture
Use of eco-innovative underwater camera, IoT, and AI

from the aquaculture community and neighbouring Mediterranean countries. The training modules remain publicly accessible to further promote sustainability in the sector. Additionally, the project facilitated business-to-business events, resulting in over 100 bilateral meetings and increased interest in adopting innovative solutions by local aquafarms.

By demonstrating the transformative potential of eco-innovative technologies, this pilot project has highlighted a strong potential to enhance profitability within Tunisian aquaculture, paving the way for increased sustainability. This is particularly relevant for Tunisia, where aquafarming plays a vital role in food security, employment, and economic diversification. The government has invested in modernizing infrastructure and expanding production capacities to support the sector's growth.



Scan the QR code to access the MED TEST III business cases for promoting RECP and valorization practices in Morocco's fish processing and Tunisia's aquaculture sectors:



Fostering circular economy and resource efficiency: The way forward for Mediterranean industries

The SwitchMed programme has played a transformative role in fostering a circular economy and sustainable development in the Southern Mediterranean region. By showcasing the tangible benefits of resource efficiency, cleaner production practices, and innovative circular business models, SwitchMed has provided industries in the region with a clear path to integrate environmental sustainability with economic benefits into their business models.

Based on insights from the pilot projects, the initiative has developed national scaling-up roadmaps, outlining policy and market-based instruments essential for the private sector's broader adoption of proven best practices. These roadmaps provide a clear, comprehensive vision for how collaborative, multi-stakeholder efforts can drive and accelerate progress toward a greener, more circular economy.

Stepping up RECP in the region

The business case for resource efficiency identified **potential on average reductions of 27% in water use, 34.6% in energy consumption, and 2.3% in material usage**, with an average return on investment in just two years. These substantial improvements, across various sectors and company sizes, position RECP as a compelling business strategy for industries, offering both short-term financial gains and long-term competitive advantages. As a result, the demand for RECP services from local industries has grown.

The region can leverage the expertise of approximately **80 service providers trained** during phases I and II of the SwitchMed industry component. Their practical experience serves as a valuable asset for scaling up UNIDO's TEST approach across

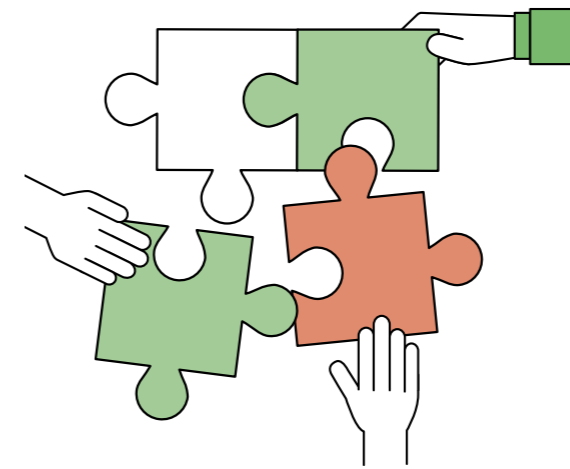
other industries regionally, promoting resource-efficient industrial practices.

The fact that companies are now seeking consultancy from trained service providers on a commercial basis highlights the long-term cultural shift towards integrating sustainability into everyday business practices. However, barriers remain, particularly for small businesses, in terms of access to know-how and financing. Greater efforts are needed to share knowledge and scale up best-practice adoption across industries. Financial incentives like guarantee schemes, soft loans, and grant programs must be reinforced to support technical audits and investments in eco-innovative technologies. In this respect, the experience of the Jordanian Ministry of Industry Trade and Supply in establishing a funding mechanism with the support of the World Bank provides an inspiring example of a good practice that other countries can replicate.

In addition, establishing a national platform or 'one-stop shop' for RECP could support businesses by providing access to essential resources—case studies, qualified service providers, available incentives, and tools like the UNIDO TEST toolkit. Local institutions, such as industrial associations, could lead these efforts, coordinating initiatives and raising awareness to reach a wider audience of their industrial members.

Strengthening partnerships with academia and vocational training centers is vital to building long-term RECP skills, through related courses or by integrating RECP into technical and vocational education. **The 18 university partnerships** in Jordan, Lebanon, and Palestine aim to cultivate a new generation of professionals with an RECP mindset, equipped to drive continuous improvements in the industry.

Policymakers across the region play a crucial role in embedding RECP within national frameworks and policies, setting priorities, strategies, and programs with dedicated financial resources to support a green and just industry transition. Mainstreaming RECP in industrial parks and key sectors provides a fast-track path to scaling up. Additionally, creating information-based incentives, such as national awards or sustainability product labels, enhances the visibility of resource-efficient practices and motivates companies to adopt them, fostering a culture of continuous improvement and sustainability across industries.



Building on the results

The outcomes from the SwitchMed projects have laid the groundwork for broader adoption of circular economy principles in the textile industry, particularly in Tunisia, Morocco, and Egypt, where circular business models for recycling pre-consumer textile waste have been successfully implemented.

These three countries produce over 330,000 tons of pre-consumer textile waste annually, much of which remains underutilized. International best practices indicate that a recovery and **recycling rate of 50% is achievable**, potentially yielding **225,000 tons of yarns with 35% recycled content** and **85,000 tons of recycled non-woven textile products**. With rising global demand for recycled fibers and increasing domestic needs for non-woven products, such as insulation boards, these countries have a significant opportunity to capitalize on their textile

waste streams. To achieve this, several key strategies must be put into place.

First, regulatory barriers limiting the economic viability of recycling textile waste need to be removed, particularly in special economic zones and among export-only companies operating under special tax regimes. Additionally, incentives should be introduced to encourage investment in advanced technologies, enabling the upgrade and expansion of the textile recycling industry. According to data from the project, the valorization of existing volumes of textile waste will need an indicative number of 40-45 new mechanical recycling lines across the three countries, along with one chemical recycling unit in Egypt, requiring investments between €230-260 million to modernize the infrastructure for the recycling value chain.

Promoting waste segregation protocols in the garment-making sector through targeted training and awareness initiatives will ensure a quality and steady supply of locally sourced feedstock for recycling units, thereby reducing reliance on waste imports and supporting new investments in recycling capacity. Localizing recycling value chains will also require advanced digital and physical infrastructure in place, along with quality labels, to enable waste aggregation and transparency in the recycling business. Integrating the informal sector, which primarily operates in waste collection, is a medium to long-term objective that will necessitate policy instruments and market-based incentives.

Textile federations and export councils can play a pivotal role by enabling members to partner with international fashion brands to launch collaborative initiatives and supporting the adoption of safer chemical management protocols. The 2035 strategy of the Moroccan Federation of Textile Industries (AMITH), "Dayem," is an excellent example of creating an enabling framework for boosting greener competitiveness within the sector.

The national fashion design schools currently lack expertise in circular business models. Expanding the successful pilot program at Casa Moda Academy in Morocco to other fashion schools and designers in the

region, along with incorporating educational programs focused on sustainability and circularity for future technicians, engineers, product managers, and designers, is essential for fostering a culture of sustainability within the industry.

The project has delivered training and technical assistance to help companies adopt safer chemical management, eliminate hazardous chemicals from industrial processes, address non-compliance in wastewater treatment, and implement stronger chemical storage and handling policies. Accessing knowledge about safer chemical alternatives, which often come at a higher cost, can be a challenge for local companies, especially considering the lack of local training providers accredited by the ZDHC. Currently, only Tunisia has the capacity to train companies on the ZDHC Guidelines, while Morocco and Egypt still depend on international experts, leading to higher costs. Establishing ZDHC-accredited laboratories for wastewater and chemical testing is also crucial for reducing testing expenses for local companies.

Unpacking a future with plastics

UNIDO's efforts to promote circular business models in Israel's plastic packaging value chain have successfully driven significant positive changes in both regulations and industry practices. The Ministry of Economy established a technical committee to release national standards for plastic recycling, and the Ministry of Environmental Protection expanded its deposit scheme to include larger 1,5-liter PET bottles, encouraging bottle-to-bottle recycling. A NIS 150 million grant scheme has been launched to upgrade municipal recycling centers.

Building on the success of a UNIDO pilot for recycling plastic films in agriculture, the Jewish National Fund (KKL-JNF) announced plans to launch a larger program for greenhouse film recycling. Scaling this effort would require establishing standards for plastic waste collection and recycled content in products, along with introducing EPR schemes to recover agricultural plastic films. Farmer associations are also poised to play a vital role in raising awareness and supporting these circular initiatives.

In 2021, the introduction of an interactive tool for designing sustainable packaging allowed manufacturers to assess recyclability, further driving industry transformation. The experience of the pilots in Israel demonstrated that transitioning to recyclable packaging is technically feasible and can be achieved with minimal cost increases for rigid food-contact containers, while moderate investments are needed to upgrade sorting and recycling technologies for flexible packaging.

A mix of regulatory measures and market-driven incentives is essential to further the adoption of recyclable packaging. For example, eco-modulation fees within Israel's EPR scheme can encourage sustainable packaging designs while increasing the cost of disposal and incineration would disincentivize unsustainable practices. Additionally, introducing national standards to mandate recycled content in packaging, similar to the EU Packaging Directive, would stimulate demand for recyclable packaging. Finally, grants for private sector innovation in sustainable packaging can also accelerate progress, for instance, in shifting toward mono-material flexible packaging that is easier to recycle.

Navigating the blue economy in the Mediterranean

Morocco's fish processing industry has significant potential to mainstream resource-efficiency practices, as demonstrated by the SwitchMed pilot results at CIBEL factories, which oversee fish canning and freezing and fishmeal-fish oil production. Scaling up these results to Morocco's more than 60 fish canning factories, 200 freezing facilities and 25 fishmeal and oil plants could enhance competitiveness while cutting 86,000 tons of CO₂ emissions and saving 3.6 million cubic meters of water annually.

The sector also holds great potential for adding value to fish by-products, which produce around 280,000 tons of waste each year, that are primarily used for fishmeal and oil. The pilot project proved the feasibility of producing three new high-value products from fish by-products: food-grade products, collagen and hydrolysates. With global market growth for biobased products



from marine sources estimated at 5-10% annually, depending on the end market (which includes pet food, aquaculture, food, cosmetics, nutraceuticals, pharmaceuticals, fertilizers, etc.), there is considerable opportunity to capitalize on this trend.

Economic incentives to stimulate R&D and investment in co-product valorization and innovative technology adoption could unlock this potential. Strengthening collaboration between national R&D institutions, such as INRH in Morocco, and the fish-processing industry would enable companies to develop prototypes and customize production units for entry into new markets for fish by-products. By mitigating financial risks through such partnerships, companies can justify investments in innovation and circularity within Morocco's fish-processing value chain.

In Tunisia, UNIDO's aquaculture pilot demonstrated strong potential for increasing profitability, particularly through adoption of new eco-innovative technology. The pilot, which focused on reducing the

fish feed conversion ratio, introducing advanced technology based on AI, underwater cameras, IoTs and solar panels, resulted in environmental and economic benefits, with a quick return on investment between 4 and 8 months. Scaling this across Tunisia's aquaculture sector could lead to substantial cost savings and environmental improvements, reducing nitrogen discharge by 1,000 tons per fish-growth cycle.

Key steps to advance eco-innovation in Tunisia's aquaculture include upgrading offshore connectivity from 4G to 5G, simplifying customs procedures for importing technology, organizing awareness raising and B2B events to connect local aquafarmers with technology providers, and strengthening institutions like INSTM and the Tunisian Aquaculture Centre to support technology transfer and awareness-raising. Ongoing research and development, aligned with industry needs, will be critical in ensuring the sector's transition toward more sustainable practices.

Looking forward: The Green Forward Industry project

Building on the successes and lessons learned from the SwitchMed Programme, the EU-funded Green Forward Industry project will continue efforts through both national and regional initiatives, ensuring these benefits are sustained and expanded in the region. The project will primarily target eight southern Mediterranean countries previously supported by SwitchMed: Algeria, Egypt, Jordan, Lebanon, Morocco, Palestine, Tunisia, and Libya. These countries will benefit from targeted regional knowledge-sharing initiatives tailored to their specific needs and contexts.

At the national level, Egypt, Jordan, Morocco, Palestine, and Tunisia will receive tailored support, including pilot projects, investment promotion efforts, and support for higher education and vocational training institutions.

This comprehensive approach ensures that sustainability and circular economy principles become well embedded in the region's development trajectory. Through these efforts, the Mediterranean region can foster resilient, competitive, and sustainable industries that benefit both the environment and the economy.

Led by UNIDO and running from 2024 to 2028, the Green Forward Industry project will focus on supporting SMEs in their transition towards a greener and more circular economy. By strengthening resource efficiency and circular practices, the project aims to enhance the competitiveness of SMEs through two primary components:

- 1. Demonstrating business models and building capacities:**
The project will demonstrate resource-efficient and circular business models while prioritizing capacity building. Activities from this output will help equip SMEs with the necessary tools and knowledge to adopt sustainable practices effectively and to gain access to financing.
- 2. Disseminating knowledge:**
The dissemination of resource-efficient and circular economy knowledge will take place at multiple levels—educational institutions, Technical and Vocational Education and Training (TVET), as well as at the policy level—ensuring that the principles of sustainability and circular economy are embedded in the educational systems and policy frameworks across the region.

In a region grappling with resource scarcity, unemployment, environmental pressures and political instability, the circular economy concept provides a practical framework for building innovation and resilience. By fostering collaboration, knowledge-sharing, and education, the Green Forward project will seek to connect immediate actions with a broader vision: an industrial landscape that supports the resilience of local, regenerative, and competitive economies, and a more balanced way in how things are produced and consumed. These efforts not only strengthen local industries but also position the southern Mediterranean as a hub for sustainable production, enhancing its competitiveness in the global economy.

Find us on switchmed.eu



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