

# MED TEST III *in Jordan*

*Advancing resource-efficient and competitive industries*

## Project summary and achievements



Implemented by:



UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION

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# The SwitchMed Programme

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 in close coordination 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 activities that span policy development, capacity building, business support services, demonstration activities and networking.

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Launched by the European Union (EU) in 2014, the regional SwitchMed programme has demonstrated the potential for a green and circular economy in eight Mediterranean countries. With the objective of upscaling the transition to Sustainable Consumption and Production (SCP) practices in the Southern Mediterranean region, SwitchMed has demonstrated business models that can reduce the inefficient use of resources and the environmental footprint of existing economic activities. It has done so through industry demonstrations, policy development, networking opportunities, and support for start-ups and green entrepreneurs.

Under the lead of the United Nations Industrial Development Organization (UNIDO), the SwitchMed industry component has, during the MED TEST II (2014-2018) and MED TEST III (2018-2023) projects, realized over 165 industry pilots demonstrating pathways for more resource-efficient and circular production models in the southern Mediterranean industry.

SwitchMed has now become one of the most relevant resource efficiency initiatives in the region, building local capacities and demonstrating the potential for resource-efficient and circular business models in industry.

Through the successful demonstration of circular business and production models, the pilots have inspired industry actors with innovative production models that involve the reuse, refurbishment, re-manufacturing, and recycling of products to optimize productivity and recirculation. By embracing these resource-efficient practices, businesses in the region can effectively adapt to the ever-changing global market and environmental conditions. These practices are essential for achieving sustainability and economic objectives in the regional industry and building resilient supply chains.





# The MED TEST III project in Jordan

Amid the slow economic recovery from the global effects of the COVID-19 pandemic, industries continue to grapple with supply disruptions, rising costs, and tenacious market uncertainty. In Jordan, expenses related to imported energy and raw materials, as well as the prevalent water scarcity, are challenging the industry's ability to operate at a competitive level. Under such conditions, resource-efficient production becomes fundamental for industries.

The previous MED TEST II (2015-2018) project revealed the potential of the TEST methodology in the Jordanian industry, highlighting the economic and environmental benefits of a more resource-efficient production. MED TEST II conducted 12 industry demonstrations in Jordanian food and beverage companies. The demonstrations identified 214 improvement measures, potentially saving these companies €2.1 million annually in energy, water and raw material consumption costs.

Building upon the success of the MED TEST II demonstrations, the Government of Jordan, UNIDO, and national stakeholders collaborated to develop a national roadmap for increasing resource efficiency in the country's industry. This roadmap, along with the National Green Growth Strategy, outlined the objectives for the MED TEST III initiative. These objectives included expanding the adoption of resource-efficient and circular business models in other industrial sectors, enhancing the capabilities of local service providers, and integrating resource efficiency into national higher education and policy frameworks.

Led by UNIDO and executed by the Royal Scientific Society (RSS), in cooperation with the Jordan and Amman Chambers of Industry, the MED TEST III project has continued, since 2019, to advance the adoption of resource-efficient production standards in Jordan's industry. The project follows a comprehensive approach and has demonstrated the business case for resource-efficient production in 15 industries from Jordan's chemical, food and beverage, and plastic sectors. To do so, MED TEST III leveraged the capacities of locally trained Jordanian service providers.

Indeed, at the start of the project, over 20 local experts and service providers were trained on the UNIDO Transfer of Environmentally Sound Technology (TEST) methodology. Following the training, eight service providers were engaged in six demonstration projects to gain "on-the-job" experience by assisting local businesses in implementing resource efficiency programmes in Jordanian factories. In addition, international sector experts supported the Resource Efficient and Cleaner Production (RECP) assessments at eight demonstration companies. This offered the service providers insight into international benchmarks and approaches.

The TEST training was extended to selected staff of the 15 companies taking part in the demonstration project. This enabled them to implement the technical measures and management solutions identified by the service providers. Training company staff while involving them actively in the identification of improvement measures ensures the sustainability of all identified actions at the company level. It transfers ownership of the TEST process within the company, paving the way for continuous improvement.

To establish a qualified offer of RECP services on the Jordanian market that other companies can benefit from, the RSS has, under the guidance of UNIDO, designed an accreditation system for service providers and industry experts who are proficient in the TEST methodology. A list of qualified service providers can already be found on the web pages of the RSS's Cleaner Production Unit and of the Jordanian Chamber of Industry's Energy and Environmental Sustainability Unit. The RSS is currently cooperating with the Technical and Vocational Skills Development Commission (TVSDC), with the support from the German Agency for International Cooperation (GIZ), to institutionalize this accreditation system.

In addition, the MED TEST III project in Jordan has raised the awareness of academic and financial institutions on RECP. Professors from six universities received training on the TEST methodology to introduce RECP/TEST into the university curricula of engineering departments.

# The TEST approach

The TEST methodology, developed by UNIDO, offers a systematic approach to identifying and exploiting the most feasible opportunities for resource efficiency and continuous improvement in the use of materials, water and energy within a company. This methodology combines essential tools for sustainable production, namely, Resource-efficient and Cleaner Production Assessment (RECPA), Material Flow Cost Accounting (MFCA) and Environmental and Energy Management Systems (EMS/EnMS). As a result of the customized integration and implementation of these tools, best practices, new skills and an innovative management culture are adopted. TEST enables any company to transition towards more sustainable production business models.

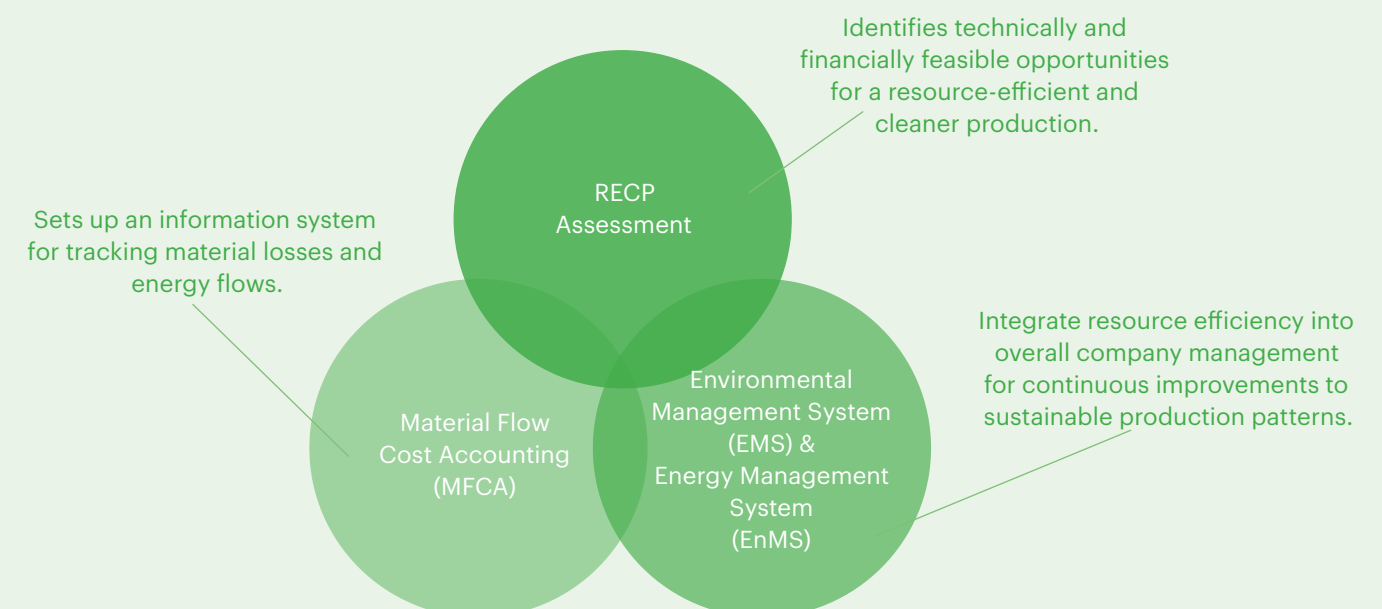
The adoption of sustainable production strategies is rooted in the concept of the "learning organization", which requires the commitment and engagement of the various stakeholders who influence resource efficiency (customers, suppliers, production managers, workers, etc.) in line with the internal management processes of a business.

At the core of the TEST methodology lies the RECP tool, a step-by-step assessment for improving production systems' resource efficiency and environmental performance. The core output of this tool is a portfolio

of financially feasible solutions, including good housekeeping, operational control improvements, process and product modifications, and eco-innovative technologies.

Within the TEST methodology, elements of MFCA are employed to strengthen priority-setting based on non-product output costs and to establish ad hoc information systems for critical material and energy flows, as well as key processes. This step is essential to monitoring significant resource losses and consumption. An MFCA-based information system is also crucial for calculating economic improvements resulting from implemented RECP measures and programmes, thereby evidencing their actual impact on medium to long-term decisions. It also enables enterprise staff accountability, as well as the reporting of demonstrated company performance against baselines and targets.

The core elements of the Environmental Management System (EMS) and Energy Management System (EnMS) are used in TEST to integrate resource efficiency into the company's overall management systems. This provides operating criteria, Standard Operational Procedures (SOPs) and the internal resource structure for ensuring that resource efficiency programmes are implemented, sustained and further developed.



# Results from the MED TEST III demonstration projects

Under the MED TEST III project, the industry demonstrations for resource-efficient production targeted companies from the chemical, food and beverage and plastic manufacturing sectors. Following a call for participants, 35 companies applied for demonstration projects, of which 15 were selected.

The industry demonstrations in Jordan identified a total of 242 resource efficiency measures. Among these, 202 measures, corresponding to approximately 83% of the total, were approved by the management of the demonstration companies and incorporated into their action plans for implementation. The resource

efficiency measures identified for the 15 participating demonstration companies could potentially save 115,239 of m³ of water, 8,671 MWh of energy, 1,635 tons of materials, and 3,375 tons of CO<sub>2</sub>-equivalent annually. As for economic savings, the identified measures have an average Payback Period (PBP) of 2.2 years and could potentially save the companies €2.7 million in annual production costs.

The table below summarizes some the financial aspects from the identified resource efficiency measures:

Name	Employees (full-time)	Investment Euro*	Savings Euro* per year	Average pay-back-period	% of water savings per year	% of energy savings per year	% of material savings per year
Chemical sector							
Al-Baha Company for Caustic Chlorine Industry	180	326,667	287,600	1.1	32%	-	0.7%
Al Qawafel Agro-Industrial Company (ALQAIC)	96	91,467	119,609	0.8	-	23.1%	0.8%
The Arab Pesticides and Veterinary Drugs Co. (MOBEDCO)	173	167,000	87,810	1.9	-	20.2%	0.1%
Chemvet - Advanced Agrochemicals and Veterinary Products Industrial Company	74	1,733,333	313,073	5.5	-	-	8.1%
Lamis Detergents Company LLC.	250	109,868	98,423	1.1	43.6%	24.7%	-
Layan for Chemicals Est.	300	89,800	68,888	1.3	28.6%	18.2%	-
Jordan Chemical Industries Company Limited (JCIC)	63	186,890	321,960	0.58	34.3%	60.3%	8.3%
Food and beverage sector							
Al-Farah Chocolate Manufacturing Co.	25	173,067	68,095	2.5	-	33.1%	2.5%
Anabtawi Sweets Co.	200	75,467	42,747	1.8	18%	10%	3%
Arabian Trade & Food Industries Co. (Al Wadi)	453	451,213	171,949	2.6	25%	15%	0.4%
Nestlé Waters	350	430,333	329,644	1.3	-	20%	-
Siniora Food Industries Company	602	410,400	298,600	1.4	6%	6%	1.1%
Tareq & Zakaria Al Faqeeh Partners – Haritna Dairy Co.	67	21,640	71,680	0.3	12%	10%	1%
Plastic sector							
Arab Medical Containers LLC.	160	1,622,763	399,320	4.1	-	44.8%	0.8%
World Plastics for Construction Industries	63	63,630	38,259	1.7	-	15.3%	0.6%
Total:	3,056	5,953,538	2,717,657	2.2			

\*Exchange rate 0.75 Jordanian Dinar (JOD) = 1 Euro

Several companies participating in the MED TEST III project were supported in accessing the finance needed to implement specific RECP measures through green loans and other existing green finance mechanisms, such as:

- the Green Economy Financing Facility of the European Bank for Reconstruction and Development (EBRD),
- the green loans of the Central Bank of Jordan (CBJ),
- the Industry Support Fund, a new industry fund introduced by the Ministry of Industry, Trade and Supply (MoITS), or
- the Jordan Renewable Energy and Energy Efficiency Fund (JREEEF).

An important development is that, in 2022, the Jordan Chamber of Industry launched the Green Factory Award to encourage environmentally responsible businesses practices. The award invited all 15 demonstration companies from the MED TEST III project to participate to its inaugural edition. Additionally, in 2023, the King Abdullah II Centre for Excellence, in collaboration with the Ministry of Environment, launched the King Abdullah II Award for Excellence/Sustainability Environment (Green Economy) Award.

8 service providers qualified on the UNIDO TEST methodology through on-the-job training

80 industry professionals trained on the TEST methodology

15 industry demonstrations completed during the MED TEST III project...

...impacting 3,056 full-time jobs in the 15 demonstration companies

242 resource efficiency measures identified

...with the potential to save the 15 companies €2,717,657 (2,038,243 JOD) in annual production costs

6 Memoranda of Understanding (MoUs) signed with academic institutions to introduce the concept of resource-efficient production and the UNIDO TEST methodology into their curricula

1 MoU signed between the RSS and the Jordan Chamber of Industry to continue collaborative efforts to enhance the adoption of resource-efficient production practices by the industry



# Enhancing resource efficiency in the chemical sector

## A case study from the Jordan Chemical Industries Company Limited (JCIC)

Based in Zarqa, the JCIC produces household cleaning and polishing products under the brand name "Hypex" for the local and regional markets (5% export).

The company's objective in joining MED TEST III was to develop a process that could increase production and reduce related losses.

The project identified several good housekeeping measures to reduce raw material losses. These included closing open vessels and mixers, improving warehouse and production line layouts, and reorganizing production processes to minimize human errors and speed up production. Most of the measures required low to moderate investments, such as switching from manual to automatic or semi-automatic activities, regular maintenance to fix worn-out pipes and leaks, improving control over production processes, and mechanizing the handling of raw materials. In total, the identified measures would require an investment of €62,265 but would help the JCIC save 932 tons of materials annually, valued at approximately €132,000.

Another critical finding from MED TEST III was the JCIC's potential for reducing electricity use. To this end, the project strongly recommended implementing various energy-saving practices, including adopting a power monitoring system. Moreover, upgrading cooling systems, using a cooling tower in winter instead of the existing chiller, replacing equipment and machines, performing regular maintenance, insulating the piping network, fixing chilled water leaks, and increasing chilled water set point will save energy costs. Improving compressed air systems involves:

- Repairing air leaks.
- Limiting air usage for specific processes.
- Using a single compressor instead of two.
- Maintaining pressure at the recommended level.
- Utilizing compressor heat recovery for water heating during steam generation.

To upgrade the company's steam systems, which is essential to operate at full production capacity, the JCIC was advised to capture and reuse the steam that has escaped from the tunnel, and transition to a fuel-operated steam boiler instead of an electric steam generator. Implementing these energy-saving measures would require an investment of €122,655, but would save the company €176,310 yearly in energy costs.

Lastly, a water analysis revealed several opportunities for significant cost savings across various production lines. These measures request low investments. They include:

- Using pressurized water for cleaning.
- Installing water-saving devices.
- Repairing water leaks.
- Purchasing Reverse Osmosis (RO)-treated water instead of continuing to operate an inefficient RO treatment system.

“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, where the problems of each department were studied and the ideal solution was implemented.

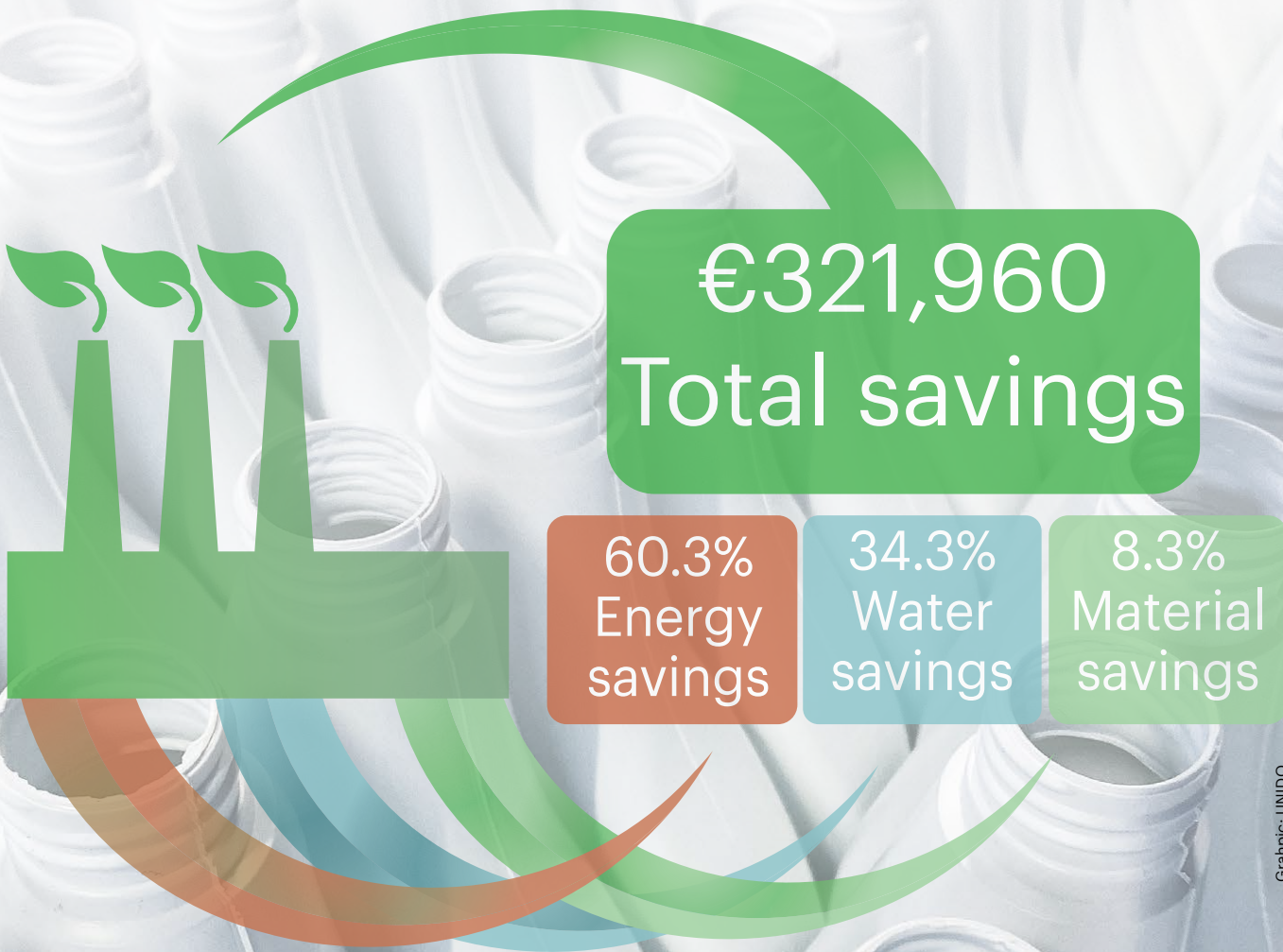
Mr. Rasmi Al-Mallah  
CEO  
Jordan Chemical Industries Company Limited (JCIC)

”The totality of the resource-efficiency measures identified during the MED TEST III project would require an investment of €186,890 Euro\* (JOD 140,170) and accumulate total annual savings of €321,960 Euro\* (JOD 241,471) in energy, water, and raw materials. The average payback period for this investment is approximately six months. Out of the 30 measures identified, 63% were accepted for implementation by top management and 27% were retained for further study. Presently, 80% of the accepted measures are being implemented.

JCIC anticipates an 8.3% decrease in materials consumption, a 34.3% reduction in water use, a 60.3% decrease in energy consumption, and an annual reduction of 500.1 tons of CO<sub>2</sub> emissions.

\*Exchange rate 0.75 Jordanian Dinar (JOD) = 1 Euro

## Identified annual savings in JCIC



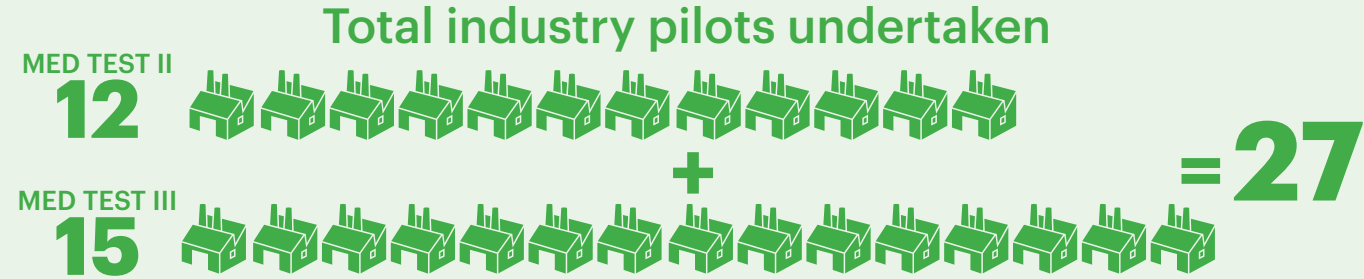
Graphic: UNIDO



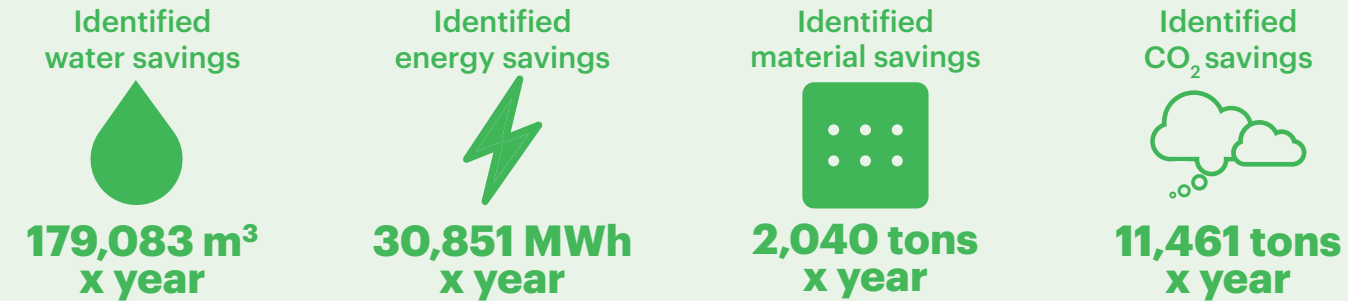
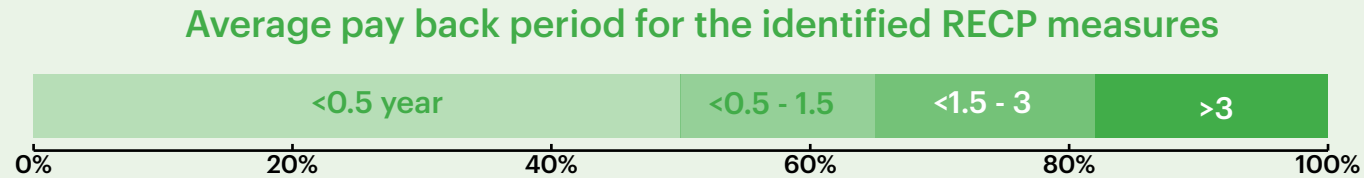
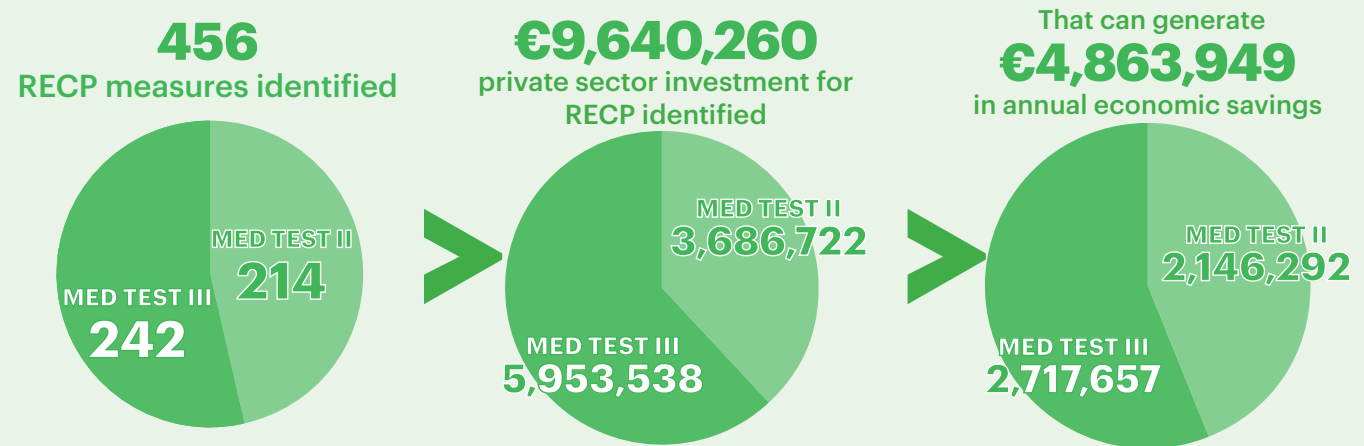
# MED TEST in Jordan

Since 2015, UNIDO and the RSS have demonstrated resource-efficient production in Jordan, showcasing its advantages for companies, industries, and society. Through the two successive MED TEST projects, it has become evident that this approach is relevant for businesses and for Jordan's long-term goal of reducing reliance on imported resources and promoting a national green growth pathway. The figures below provide evidence of the success of this initiative.

**19** Service Providers qualified on the UNIDO TEST Methodology



Impacting **5,368 jobs** (number of employees from the 27 companies)



# The way forward for RECP in Jordan

## Mainstreaming resource efficiency into education, national programmes and policy frameworks

Mainstreaming resource efficiency in educational programmes was a key objective of the MED TEST III project. Between 2021 and 2022, the RSS signed six MoUs to integrate RECP into the curricula of renowned academic institutions, including the Jordan University of Science and Technology (JUST), the Irbid Chamber of Industry and five additional universities<sup>1</sup> in central and southern Jordan, together with the Amman Chamber of Industry. A series of awareness-raising and training activities were delivered to university professors and key institutional representatives, leading to the development of a syllabus for a RECP course.

The results and recommendations from both phases of the SwitchMed programme (MED TEST II and MED TEST III), as well as the related outreach, have informed policy decision-making processes at country level for mainstreaming RECP into the national institutional setup as follows:

- The new Economic Modernization Vision provides for a national programme for resource efficiency. The implementation of circular economy practices in industrial activities (especially eco-industrial parks) through RECP support is also mentioned as a part of green growth.
- RECP and the UNIDO TEST methodology and assessment have been included in the Green Growth National Action Plan 2021-2025.
- The Ministry of Environment (MoEnv) has reactivated the King Abdallah II Award for Excellence in the area of environment sustainability, with a special focus on RECP in the industrial sector.
- A new Industrial Support and Development Fund was established at the Ministry of Industry, Trade and Supply (MoITS), with the support of the World Bank. The Fund should provide extra grants to help industries implement RECP measures.

The RSS, with the support of UNIDO, has systematically engaged with national institutions and donors to ensure synergies, building new scaling-up initiatives and contributing to knowledge sharing, based on its experience from the SwitchMed/MED TEST III project. The most relevant initiatives are:

- A grant agreement was signed in January 2021 between the RSS and the GIZ to implement a new project named "RECP Service Package - Design and Development of Tools for micro and small enterprises in the Food Processing Sector". The implementation of this project (2021-2022) has developed a specific training package built on the UNIDO TEST methodology and tailored for micro (4 employees or less) and small (5 to 19 employees) food companies.
- In March 2021, an agreement was signed between the RSS and the Royal Academy of Engineering to implement a project titled "Integrating and Digitizing RECP in Food Industries: Towards Circular Economy in Jordan". The environmental and fiscal benefits of RECP have been digitized and tracked using Decapolis blockchain digital technology and Internet of Things sensors at one of the SwitchMed food demonstration companies (Al-Wadi).
- National stakeholders, RSS and UNIDO, discussed the structure of a national RECP support programme as well as synergies with a new related project by the GIZ, "Green Actions in Enterprises (GAIN)". The GAIN project will build upon the outcomes of the policy advocacy dialogue conducted under MED TEST II and III, as well as the related RECP scaling-up roadmap for Jordan.
- A new agreement was concluded between the EU and RSS as part of Green Innovation Projects of the EU support to Green Economy in Response to the Syrian crisis in Jordan 2021-2024. "Building Resilience through Circularity: Green Innovations in Host Communities and Azraq Refugee Camp (BRCKA)". This project includes a working package on RECP in micro, small and medium-sized enterprises.
- Finally, the EU bilateral program "Support to Green Economy in Jordan 2021-2024" will provide economic incentives to the government when verifying the implementation of 15 additional integrated RECP practices in industrial facilities and 100 energy audits, among other actions related to resource efficiency. The project will leverage upon the national capacities established within MED TEST III.

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