MED TEST II
Transfer of Environmentally Sound Technology in the Southern Mediterranean Region

Lebanon
The SwitchMed Program is funded by the European Union and implemented by the United Nations Industrial Development Organization (UNIDO) in cooperation with UN Environment Mediterranean Action Plan (UN Environment/MAP), the Regional Activity Centre for Sustainable Consumption and Production (SCP/RAC), and the UN Environment Economy Division.

This publication has been produced with the assistance of the European Union.

The content of this publication is the sole responsibility of UNIDO and can in no way be taken to reflect the views of the European Union.

The designations employed and the presentations of material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the limitations of its frontiers and boundaries.

Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the state reached by a particular country or area in the development process.

The mention of company names or commercial products does not imply endorsement by UNIDO.

January 2018 by the United Nations Industrial Development Organization
This document has been produced without formal United Nations editing

For more information on the UNIDO activities within the SwitchMed initiative, please get in touch with us at:
c.gonzalez-mueller@unido.org
The EU funded SwitchMed Program is about changing the way goods and services are produced and consumed, so that human development is decoupled from environmental degradation. SwitchMed strives to assist the Southern Mediterranean Region to switch to more Sustainable Consumption and Production (SCP) patterns, enabling the actors in this region to realize their full economic potential. It supports industries, emerging green entrepreneurs, service providers, civil society, and policy makers through demonstration activities, policy development, and networking of incubators for eco innovation in order to catalyze progress towards low carbon and climate resilient societies, and gives rise to new economic opportunities.

Turning challenges into opportunities is at the core of the MED TEST II component, a unique and innovative part of the SwitchMed program. The Transfer of Environmentally Sound Technology (TEST) methodology from UNIDO addresses rising energy and raw material costs by demonstrating how best practices in Resource Efficient and Cleaner Production (RECP), with an attractive return on investment, can be integrated into current business operations.

Enhancing productivity by integrating practices and technology that lead to greater efficiency in the use of natural resources, to a reduction of waste and energy consumption, and to opportunities for innovation and value creation, is central to the UNIDO TEST approach.

Adopting a resource efficient and cleaner production (RECP) not only leads to better environmental performance for the industry, it also enables businesses to operate more competitively while at the same time saving money, and also providing businesses with the scope to invest and grow sustainably. But efficiency in production also contributes to saving valuable resources, such as energy and water, for the national economy. Hence, the economic benefits of RECP extend far beyond lowering production costs for businesses as it also contributes to additional growth, a sustained job creation, and supports the long-term resource resilience of Lebanon.
The prevailing economic and social instability in the neighboring region to Lebanon (loss of markets due to closure of borders with contiguous countries, increased pressure on infrastructures, increased informal competition) is a setback for Lebanon’s own development and constrains the competitiveness of Lebanese businesses. Power supply interruptions and dependency on expensive and carbon-intensive fossil fuels for energy are among the reasons why energy efficiency and switching to renewable sources are top priorities for the national industry. In common with the energy situation, water also continues to face distribution problems in Lebanon. Although water is considered an almost free resource for most businesses, many companies must drill their own wells or purchase water to meet their water consumption needs. Moreover, national businesses must also now cope with rising transportation costs for delivering their goods to nearby markets, which coupled with increasing prices for raw materials and the aforementioned socio-economic challenges, underpin the message that resource savings would not only improve the economic situation for the industry, but also contribute to ensure resource availability to other parts of the society.

The MED TEST II Program, implemented in Lebanon from 2015 to 2017, addresses the challenges and the barriers national industries are facing in becoming more resource and energy efficient, non-polluting and safe, and assists in producing goods that are responsibly managed throughout their life cycle, while also increasing productivity and maintaining access to international markets with good quality products that comply with international standards.

Under the patronage of the Ministry of Industry (MoI) and the Ministry of Environment (MoE), the MED TEST II Project in Lebanon has been led by the Industrial Research Institute (IRI), in collaboration with the Association of the Lebanese Industrialists (ALI), the Chamber of Commerce, Industry and Agriculture of Beirut and Mount Lebanon (CCIA-BML), and Banque du Liban (BDL) to mobilize funding and support for a sustained application and scaling-up of RECP in Lebanon.

in collaboration with
Through creative thinking and effective collaboration, the UNIDO TEST integrated approach targets all management levels of a company, involving people with different professional backgrounds and operational responsibilities, in order to enhance and sustain the efficient use of production inputs and environmental performance, encouraging a business culture where eco-innovative business solutions can thrive.

"The project is one of the best projects we have ever implemented. It improved company financial and managerial situation and introduced good practices at operational and maintenance levels. Thanks to the resource monitoring system installed at the onset of the project, the culture of performance monitoring is now ingrained in the company.

Camille Skaff
Owner,
Skaff Dairy Farm"

"The TEST methodology builds on the following tools:

- **RECP Assessment**: Identifies technically and financially feasible opportunities for a resource efficient and cleaner production
- **Material Flow Cost Accounting (MFCA)**: Setting up an information system for tracking material losses and energy flows
- **Environmental Management System (EMS) & Energy Management System (EnMS)**: Integrates resource efficiency into overall company management, leading toward continuous improvements of sustainable production patterns

Connecting RECP assessments with present-day standards in environmental and energy management systems, together with the material flow cost accounting standard ISO14051, enables businesses to establish an integrated system to identify and track losses in energy, water, and raw material inputs. The TEST methodology builds across-the-board understanding and capacities within various management areas of a company enabling a holistic understanding and support for RECP within the business.
Stepping up Lebanon’s capacities for a green growth

78 professionals from business consultancies, government institutions and industries received training on the TEST tools during the demonstration phase of MED TEST II in Lebanon.

One of the core objectives of the MED TEST II Program is to reinforce the local capacities of service providers in resource efficiency tools and to develop local markets for sustainable production services. By the end of the project, 8 Lebanese professionals from 8 consultancy firms were qualified on the UNIDO TEST approach, and will now be able to continue to provide integrated resource efficiency services to the local industries. The extensive on-the-job training, combined with an evidence based best-practice methodology and a technical assistance program, has been effective in bringing the industry closer to innovative knowledge networks and practitioners with hands on experience in resource efficient and cleaner production. This will enable the MED TEST II initiative to be scaled up beyond the duration of the project to the wider benefit of the industries in the food and beverage sector, and other sectors in Lebanon, leveraging on the local capacities and expertise gained and adapted to guide the national diffusion of sustainable production solutions.

Following an extensive marketing campaign entailing workshops and one-to-one company visits, 13 companies were selected for an initial assessment, out of which 8 demonstration companies from the food and beverage sector signed up for the MED TEST II project. The Lebanese demonstration companies range from SME’s with 6 full time employees to large companies with 382 employees located in several areas of Lebanon and covering different industrial zones in Mount-Lebanon and the Bekaa Valley. The food sector was selected because of the high “replicability” potential of the results to other similar production sites, and with the aim of producing ripple effects from the TEST project in Lebanon.

"The TEST approach presented in the MED TEST II project constitutes a win-win solution for industry: by cutting losses in resources, industrial companies can reduce their production costs and at the same time lower their environmental footprint, which will lead to enhanced competitiveness."

Ramzi Shasha, SwitchMed Focal Point, Ministry of Industry

Companies were initially motivated by the expectation that the project could help them reduce energy related production costs and also enhance the awareness of their staff about RECP. A few companies were also motivated by the need to receive technical support to comply with the environmental national regulations.

<table>
<thead>
<tr>
<th>Service Providers</th>
<th>MORES s.a.r.l</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apave Liban</td>
<td></td>
</tr>
<tr>
<td>ECODIT Liban</td>
<td>Rafik El Khoury &amp; Partners Consulting Engineers</td>
</tr>
<tr>
<td>ELARD s.a.r.l</td>
<td>S.E.S s.a.l</td>
</tr>
<tr>
<td>Kabbara &amp; Partners</td>
<td>SGS Liban s.a.l</td>
</tr>
</tbody>
</table>

"Following an extensive marketing campaign entailing workshops and one-to-one company visits, 13 companies were selected for an initial assessment, out of which 8 demonstration companies from the food and beverage sector signed up for the MED TEST II project. The Lebanese demonstration companies range from SME’s with 6 full time employees to large companies with 382 employees located in several areas of Lebanon and covering different industrial zones in Mount-Lebanon and the Bekaa Valley. The food sector was selected because of the high “replicability” potential of the results to other similar production sites, and with the aim of producing ripple effects from the TEST project in Lebanon."

Ramzi Shasha, SwitchMed Focal Point, Ministry of Industry

Companies were initially motivated by the expectation that the project could help them reduce energy related production costs and also enhance the awareness of their staff about RECP. A few companies were also motivated by the need to receive technical support to comply with the environmental national regulations.

<table>
<thead>
<tr>
<th>Service Providers</th>
<th>MORES s.a.r.l</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apave Liban</td>
<td></td>
</tr>
<tr>
<td>ECODIT Liban</td>
<td>Rafik El Khoury &amp; Partners Consulting Engineers</td>
</tr>
<tr>
<td>ELARD s.a.r.l</td>
<td>S.E.S s.a.l</td>
</tr>
<tr>
<td>Kabbara &amp; Partners</td>
<td>SGS Liban s.a.l</td>
</tr>
</tbody>
</table>

The TEST approach presented in the MED TEST II project constitutes a win-win solution for industry: by cutting losses in resources, industrial companies can reduce their production costs and at the same time lower their environmental footprint, which will lead to enhanced competitiveness."

Ramzi Shasha, SwitchMed Focal Point, Ministry of Industry

Companies were initially motivated by the expectation that the project could help them reduce energy related production costs and also enhance the awareness of their staff about RECP. A few companies were also motivated by the need to receive technical support to comply with the environmental national regulations.
Initial assessments in the 8 MED TEST II demonstration companies in Lebanon showed clear potentials for reducing consumption of raw materials, water and/or energy.

The TEST methodology introduced the Material Flow Cost Accounting tool (MFCA) as one of the major innovations. The MFCA analysis revealed to the company the real cost of raw material losses and inefficiencies. Through the TEST approach, both monetary and volume data related to production losses have been compiled leading to the “finance” and “technical” company staff working together.

This results in putting a price tag on the losses and shedding light on the savings potential in monetary terms. Analysis of the data showed that in some cases the annual cost of water and energy usage were lower than the costs resulting from raw material losses. This helps the plant to choose the critical areas in which to focus its efforts to identify sources of inefficiency and improvement measures.

The table below summarizes the financial and environmental indicators of the total identified approved measures in the 8 demonstration companies.

<table>
<thead>
<tr>
<th>Company</th>
<th>No. of employees¹</th>
<th>Investment Euro</th>
<th>Savings Euro / yr.</th>
<th>Avg. PbP yr.</th>
<th>Water % / yr.²</th>
<th>Material % / yr.²</th>
<th>Energy % / yr.²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food and beverage sector</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HMBR Manufacturing and Trading co s.a.l</td>
<td>382</td>
<td>1,002,441</td>
<td>1,211,561</td>
<td>0.8</td>
<td>21</td>
<td>4.7</td>
<td>13.4</td>
</tr>
<tr>
<td>Skaff Dairy Farm</td>
<td>11</td>
<td>19,315</td>
<td>38,859</td>
<td>0.5</td>
<td>15</td>
<td>2.8</td>
<td>44</td>
</tr>
<tr>
<td>A-Z Manufacturing &amp; Trading</td>
<td>40</td>
<td>154,340</td>
<td>124,052</td>
<td>1.2</td>
<td>12</td>
<td>3.3</td>
<td>36</td>
</tr>
<tr>
<td>Bach Snacks</td>
<td>140</td>
<td>22,008</td>
<td>79,502</td>
<td>0.3</td>
<td>85¹</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>Chamssine Bakeries</td>
<td>150</td>
<td>73,438</td>
<td>93,890</td>
<td>0.8</td>
<td>8</td>
<td>-</td>
<td>5.7</td>
</tr>
<tr>
<td>Manara Dairy</td>
<td>6</td>
<td>16,000</td>
<td>7,200</td>
<td>2.2</td>
<td>-</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>Dirani Group</td>
<td>350</td>
<td>157,500</td>
<td>65,310</td>
<td>2.4</td>
<td>-</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>B. Ghrawi for chocolate</td>
<td>118</td>
<td>2,200</td>
<td>9,545</td>
<td>0.2</td>
<td>-</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,197</td>
<td>1,447,242</td>
<td>1,629,919</td>
<td>0.9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ Full time employees in production departments only
² Cost savings compared to the production year 2015
³ Cost savings compared to the production year 2016

"Thanks to the MFCA tool, we were able to attribute costs to our losses, identify important materials savings and acknowledge the importance of increasing information exchange between the production, sales and accounting departments”

Marwan El Koussa, Chairman of the Board of Directors and Owner, HMBR Manufacturing and Trading Co.
A total of 111 resource efficiency measures were identified by the TEST team in the 8 demonstration companies. Of these 101 measures, corresponding to approximately 91% of the total measures, were approved by management in these companies and included in the action plan for implementation in 2017.

In the 8 plants a potential saving of over 1.6 million euros annually was identified, resulting in energy savings of 14,376 MWh/year; water savings of 53,412 m³/yr.; 544 t of raw material savings, and 523 t of landfilled solid waste avoided.

While substantial savings were identified, the majority of the identified measures had a payback period (PBP) of less than half a year (60%), showing the high profitability of resource efficiency.

**Pay-back period of identified measures at the demo companies**

<table>
<thead>
<tr>
<th>Pay-back period</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>0&lt;PbP&lt;0.5 yr.</td>
<td>18%</td>
</tr>
<tr>
<td>0.5&lt;PbP&lt;1.5 yr.</td>
<td>22%</td>
</tr>
<tr>
<td>1.5&lt;PbP&lt;4 yr.</td>
<td>60%</td>
</tr>
</tbody>
</table>

**Annual savings**

€ 1,629,919

*Implemented, under implementation or planned at the time of this publication*
A profitable solution for industry and environment in Lebanon

As recommended by the Med TEST II project team, at project’s start, each company installed a set of meters to monitor energy and water use at key consumers. A total of 475 meters were installed in the 8 companies with an investment of 120,108 euros, showing the high commitment of top management and a raised awareness on the importance of resource efficiency. The installation of this resource monitoring system, together with the formulation of an RECP policy, and the recommendation to improve accounting systems (MFCA) for material losses, will facilitate companies’ adoption of environmental and energy management standards and also enable them to have continuous improvements in resource efficiency as a routine practice in future.

"Thanks to the project, we achieved in 2 years energy efficiency improvements that would have taken us 10 years to accomplish without project intervention."
Ahmad Dirani, General Manager
Dirani Group

"The TEST methodology constitutes an environmental added value for industrial companies as it helps them lower their environmental footprint on one hand and decrease the cost of their environmental compliance on the other.
Bassam Sabbagh
SwitchMed Focal point,
Ministry of Environment"

"In order to respond to high investment requirements, companies were assisted by the MED TEST II project to access the existing green financial incentives that have been developed by Banque du Liban as part of its strategic policies to support the Lebanese economy. In addition, initiatives were conducted within the scope of the project to develop integrated RECP loans for industry in the future.

On the other hand, all the companies prepared their EMS policy statements and were provided with specific guidelines to integrate RECP in their management system and towards the end of the Project, one of the companies decided to start ISO 14001 certification. During the Project implementation, one of the companies conducted an assessment for its water footprint and is now able to manage and monitor its water consumption more efficiently.

Estimated environmental benefits*

<table>
<thead>
<tr>
<th>Water savings</th>
<th>Energy savings</th>
<th>CO₂ reductions</th>
<th>Waste reductions</th>
<th>COD reductions</th>
<th>BOD₅ reductions</th>
</tr>
</thead>
<tbody>
<tr>
<td>53,412 (m³/yr.)</td>
<td>14,376 (MWh/yr.)</td>
<td>3,567 (t/yr.)</td>
<td>523 (t/yr.)</td>
<td>7.3 (t/yr.)</td>
<td>6.3 (t/yr.)</td>
</tr>
</tbody>
</table>

*Of approved measures
Partners for RECP in Lebanon

To share our vision of a system wide change towards sustainable consumption and production in the Southern Mediterranean requires the efforts of all society actors. The MED TEST II demonstration project in Lebanon has revealed how additional economic or environmental benefits can be gained from the RECP methodology, by using the integrated approach of TEST and without interfering in the business operations of the industries.

Moreover, the MED TEST II Project has reinforced the capacities of the local service providers offering RECP competence, to help develop solutions for Lebanon that increasingly decouple production from the consumption of finite resources.

National team

Core TEST Team:

Supporting Technical Team:
Nada Sabra/ Regional Monitoring Expert, Hicham Abou Jaoudeh and Abdallah Ahmad/ Policy Experts, Salim Kfoury (IRI Financial and Administrative Director).

International Team
Carolina Gonzalez-Mueller (Project Manager), Roberta De Palma (Chief Technical Advisor), Vladimir Dobes (Senior TEST Expert), Christine Jasch (MFCA Expert), Mohamed Ghoul (International Food & RECP Expert), Michael Barla/ Communication Specialist, Vladimir Anastasov/ Headquarters Project Coordinator.

Acknowledgment

The project team would like to thank the partners and stakeholders of the Switchmed MED TEST II Project for the valuable input provided during its implementation. Particular thanks are due to the technical experts, namely Mr. Ramzi Shasha and Ms. Chantal Akl from the Ministry of Industry, Mr. Bassam Sabbagh and Ms. Olfat Hamdan from the Ministry of Environment, Ms. Rana Tabcharani Saliba and Mr. Mounir Bissat from the Association of the Lebanese Industrialists, Mr. Elie Massoud from the Chamber of Commerce, Industry and Agriculture of Beirut and Mount-Lebanon, Ms. Aline Farajian, and Mr. Mazen Halawi and Mr. Mario El Khoury from Banque du Liban.

Implementing partners

United Nations Industrial Development Organization
Department of Environment
Vienna International Centre, P.O. Box 300 1400 Vienna, Austria
Telephone: (+43-1) 26026-0, Fax: (+43-1) 26926-69
E-mail: c.gonzalez-mueller@unido.org
Web: www.unido.org

Industrial Research Institute
IRI Premises - Lebanese University Campus
Hadath (Baabda)-Lebanon P.O.Box: 11-2806 Beirut
Tel/Fax: +961 5 467831 ext 245
Mobile: +961 3 286340
E-mail: m.haidar@iri.org.lb
Web: www.iri.org