

# MED TEST III Lebanon

Transfer of Environmentally Sound Technologies

Chemical sector

*Société d'Oxygène et d'Acétylène du Liban (SOAL)*

## Company overview

**Number of employees:** 51 Full-time employees and between 30 employees in the distribution chain.

**Key products:** industrial and medical gases and liquids such as liquefied Carbon dioxide (CO<sub>2</sub>) and Nitrous Oxide (N<sub>2</sub>O) as well as liquid and gaseous Oxygen (O<sub>2</sub>), Nitrogen (N<sub>2</sub>), Argon (Ar), Dissolved Acetylene and other gases.

### Main markets:

Local hospitals, medical centres and industries

**Standards & certifications before MED TEST III:** ISO 9001

Société d'Oxygène et d'Acétylène du Liban (SOAL) was established in 1961 and is a supplier of various industrial and medical gases such as liquefied Carbon Dioxide (CO<sub>2</sub>) and Nitrous Oxide (N<sub>2</sub>O) as well as gaseous Oxygen (O<sub>2</sub>), Nitrogen (N<sub>2</sub>), Argon (Ar), Acetylene and other gases. SOAL's vision is to achieve unrivaled efficient performance and reliability and become the number one trusted supplier in Lebanon of medical and industrial gases for the healthcare and industrial sectors.

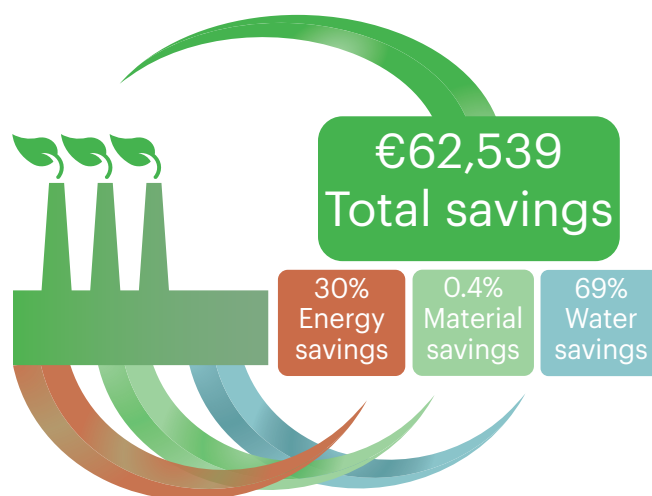
SOAL's processes consist mostly of reception, storage and subsequent filling of products in tankers and cylinders in addition to the onsite manufacture of acetylene gas. SOAL operates at high technology standards with particular attention to the environment.

## Benefits

The MED TEST III project identified total annual savings of €62,539 \* related to energy, water, and materials efficiency with an estimated investment of €182,236. The average pay-back period for the identified measures is about three years. The top management accepted to implement all of the measures. However, only six of the eight identified measures will be implemented in the short term, while the remaining will be implemented at a later stage due to the required investments.

The identified measures have the potential to reduce energy consumption by 30%, water usage by 69% and materials recovery (Calcium Hydroxide) by 85% while lowering Greenhouse Gas (GHG) emissions by 128 tons of CO<sub>2</sub>-eq per year.

## Identified annual savings



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The main motivation for joining the MED TEST III project was our concern to reduce operating costs, particularly regarding energy and water consumption. We were also aiming at finding ways that could help to recover wastewater streams and valorize materials such as calcium hydroxide. These measures are expected to enhance our productivity and improve our environmental performance.

Mr. Fouad Haddad  
General Manager, SOAL

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As part of the EU-funded SwitchMed programme, UNIDO demonstrates in the MED TEST III project pathways for industries in the Southern Mediterranean to become more resource efficient and to generate savings for improved competitiveness and environmental performance.

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## Saving opportunities\*\*

Actions	Economic key figures			Resource savings & Environmental impacts		
	Investment Euro*	Savings Euro* per year	Payback period years	Water & Materials per year	Energy MWh per year	Environmental impact per year
Good Housekeeping Practices	373	4,261	0.1	-	41	128 tons CO <sub>2</sub> eq 1,935 m <sup>3</sup> water 47.5 tons materials***
Water recovery and re-use in the acetylene plant	3,974	5,418	0.7	1,935 m <sup>3</sup> Water	-	
Recover calcium hydroxide Ca(OH) <sub>2</sub>	33,489	12,127	2.8	47.5 tons	-	
Improving electrical network power factor	4,475	1,472	3.0	-	5	
Installing a PV system	139,925	39,261	3.6	-	140	
<b>TOTAL</b>	<b>182,236</b>	<b>62,539</b>	<b>2.9</b>	<b>1,935 m<sup>3</sup> Water 47.5 tons</b>	<b>186</b>	

\* Using average exchange rate October 2022-October 2023 1 USD=1.072 Euro

\*\*Numbers based on the production value: 2022

\*\*\* Refers to solid Calcium Hydroxide (Ca(OH)<sub>2</sub>) recovered from waste water

### Good Housekeeping Practices (GHP)

Two good housekeeping measures were identified, enabling the company to achieve annual savings of €4,261 at an exceptionally low cost of €373, resulting in a payback period of just one month. These measures include improving the combustion efficiency of the onsite electricity generators by properly tuning the engines as well as cleaning and combing the condenser coils to improve heat transfer.

### Water recovery and re-use in the acetylene plant

Three measures related to the recovery and re-use of water were identified in the acetylene plant enabling SOAL to save €5,418 per year for an investment of €3,974, resulting in a payback period of 9 months. These measures involve reusing the cooling water of acetylene cylinders and compressor by diverting it through a storage tank instead of a cooling tower. Furthermore, the measures suggest recovering and reusing water from previous batches used to cool the acetylene reactor by settling the water into the appropriate basins. These measures will enable SOAL to reduce water consumption and subsequently wastewater generation by 1,935 m<sup>3</sup> per year.

### Recover calcium hydroxide

Calcium hydroxide is produced as a by-product of the acetylene production process. Currently, it settles at the bottom of basins and is subsequently transported outside the plant for disposal by private trucks at a high cost, amounting to around €14,000 per year.

The proposed measure suggests recovering the settled carbide lime slurry, which essentially consists of hydrated calcium hydroxide. The reclaimed slurry, representing an annual quantity of 47.5 tons of calcium hydroxide, can have multiple applications such as the neutralization of acid effluents, the flocculation of suspended matter in water, disinfection of wastewater treatment plant sludge, and as a whitewash for surface painting. Additionally, it can scrub thermal power plant smoke or disinfect municipal solid waste.

The carbide lime slurry can be also dried under the sunlight without the need of any additional energy input to produce lime powder. The latter can be used for liming soils, and for road construction works. Powder lime can also be reconstituted with water to form a paste that can be used in the construction sector as a stand-alone paste (ex. to fill cracks) or as construction additive.

### Improving electrical network power factor

The actual power factor at SOAL is relatively low (below 0.8), which induces increased operating currents in the electrical system. This measure aims to install power factor correction capacitors, which will reduce the operating currents sensibly and corresponding energy losses.

### Installing a PV system

Considering that all diesel consumption at SOAL is related to electricity generation, this measure suggests installing a 150 KWp Photovoltaic (PV) system with a 15-KWh lithium-ion battery storage. The PV system is estimated to supply around 140 MWh of electricity per year, which is around 23% of SOAL's annual electricity consumption. This measure will enable the company to save €39,261 per year at an investment cost of €139,925, resulting in a payback period of 3.6 years.

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The cooperation with the UNIDO team has contributed to reaching a higher level of our stated objectives related to efficiency in the use of resources, mainly the efficient use of water and electricity and the reduced pollution from wastewater along with the recovery of valuable materials from it.

Mr. Fouad Haddad  
General Manager, SOAL

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### For more information contact:



UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION

United Nations Industrial Development Organization  
Ms. Ulvinur Müge Dolun  
Division of Circular Economy and Environmental Protection  
Circular Economy and Resource Efficiency Unit  
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria  
E-mail: u.dolun@unido.org Web: www.unido.org