

Blue Economy Circular Value Chains

Business case: Resource efficiency in Morocco's fish processing industry Freezing factory

Company overview

Sector: Fish processing (Seafood freezing)

Name: Complex Industriel Belhassan (CIBEL)

Number of employees: 7 Full-time and 60 part-time employees

Key products: Frozen fish and frozen cephalopods

Main markets: Frozen cephalopods export (Europe, Asia, Africa), Frozen fish for the canning unit

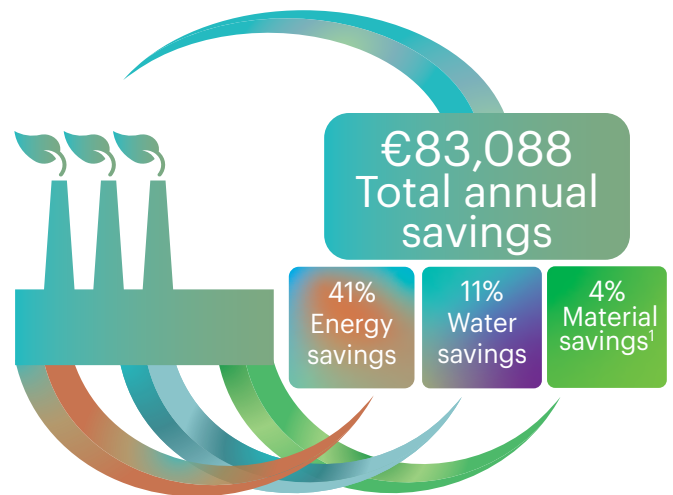
Standards & certifications before MED TEST III: ISO 9001, ISO 14001 and Health and Safety Management System OHSAS 18001

Complex Industriel Belhassan (CIBEL) is a prominent fish processing factory located in the coastal city of Agadir and is a significant producer in the region's thriving seafood industry. With a history dating back several decades, CIBEL has always been committed to maintaining quality and sustainability in its operations. Through eco-friendly practices and close collaboration with local fishermen, CIBEL is committed to developing the economy and preserving marine resources. With a dedication to providing delicious and nutritious seafood, CIBEL remains a trusted name in the Agadir community and among Moroccan industrial groups producing canned fish and seafood products.

As a vertically integrated group, CIBEL comprises fish canning, fish meal/fish oil and fish freezing factories. This case study focuses on the fish freezing factory, operated by its subcontractor Ever Freeze, located in the industrial zone Anza of Agadir, which produces 1,900 tons of frozen fish and 700 tons of cephalopods per year.

Benefits

The project identified six measures that could yield annual economic benefits of €83,088 in energy, water and raw materials. The identified measures require an estimated investment of €260,274 with an average payback period of 3.1 years. The identified measures may result in an annual CO₂ reduction of 308 tons and 49 tons of Chemical Oxygen Demand in the sewage.



1: 4% material savings in the cephalopods production line
Data based on the production year 2022

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Our collaboration in the SwitchMed project, which focused on resource efficiency in the Moroccan fish processing industry, demonstrates our commitment to environmental sustainability and our determination to catalyse positive change within the industry and stimulate economic development in our region.

Meryem Chtairi

Senior Manager Quality, Health, Safety & Environment
CIBEL

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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 and environmental impacts		
	Investment Euro*	Economic benefits Euro* per year	Payback period years	Water and Materials per year	Energy MWh per year	Environmental impact per year
Optimization of the freezing process	20,548	7,306	2.8	163 m ³	-	Total: 308 tons of CO ₂ 49 tons of COD 35 tons of BOD
Heat and water recovery in the refrigeration process	41,096	12,055	3.4	800 m ³	136	
Energy management system and installation of renewable energy	128,128	30,200	4.2	-	360	
Valorization of cephalopods by-products	70,502	33,527	2.1	25 tons***	****	
TOTAL	260,274	83,088	3.1	963 m³ 25 tons	496	

*Exchange rate as 1 Euro = 10.95 Dirham

** Numbers based on production value from 2022

*** implementing this measure, as a new production line requires an annual consumption of 25 m³ of water
**** implementing this measure, as a new production line requires an annual consumption of 59 MWh of energy

Optimization of the freezing process

Sardines and mackerels are mostly frozen in brines. Automated monitoring through sensors extends the lifespan of brine by 30% while reducing salt intake by sardines, consequently mitigating off-flavours associated with fat oxidation. Simultaneously, this solution minimizes the discharge of used brine into wastewater. With a moderate investment of €20,000 and a Payback Period below three years, this measure has significant positive benefits on water discharges, demonstrating an environmentally responsible and efficient solution.

Heat and water recovery in the refrigeration process

The refrigeration area consists of negative cold chambers (-22 °C). Two significant savings options were recommended:

- **Installing more economical refrigeration units.** New-generation compressors offer high efficiency at full and exceptionally high efficiency at partial loads. Operating without oil and utilizing magnetic bearings (eliminating contact), they feature low inrush currents and high reliability. Compared to standard chiller units, they provide an additional 40% increase in Coefficient of Performance (COP), making them an optimal choice for energy-efficient cooling solutions. This technology enables a 30% energy saving, resulting in 120,000 kWh per year with an initial investment of €30,000 and a Payback Period of 2.5 years at current production capacities.
- **Recovery of heat from the evaporation condenser.** The heat generated by the condensers in the freezing chambers' refrigeration units and negative cold rooms can be coupled to heat the rinsing water used for crates, thereby minimizing water consumption in the crate cleaning process. This process consumes approximately 2,500 m³ of water, where a water saving of 30 to 40% can be achieved, which equals up to 800 m³ of potable water annually.

Energy management system and installation of renewable energy

This measure enables the factory management to monitor the power consumption on the main panels throughout both weekdays and weekends, ensuring no ongoing or unregulated power consumption during periods of inactivity or on weekends. Moreover, by installing sub-metering sensors at each machine for power, compressed air and cooling, KPIs for each machine can be calculated and monitored with each production batch. This measure allows the company to identify the inefficiencies and root causes easily. In addition, a study conducted during the audits revealed that the factory can produce 300,000 kWh per year with a photovoltaic investment of €117,000 and a Payback Period of less than five years.

Valorization of cephalopods by-products

During the preparation process of cephalopods, some components such as viscera, eyes, and beaks are usually thrown away, totaling up to 25 tons per year. Viscera, which constitute approximately 4% of the total weight, have intrinsic value for producing ensilage for aquaculture. This end-product can have promising applications in the aquaculture industry, entering fish feed formulations that stimulate growth and reduce juvenile mortality. With the global aquafarming market expanding, this investment holds interesting commercial potential for the fish processing sector. Implementing this valorization measure could yield an extra €34,000 in revenue annually with €70,000 investment and a payback period of 2.1 years.

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The SwitchMed project has identified cost-effective measures with the potential to deliver significant annual benefits for CIBEL. Implementing these measures would not only deliver financial savings, but also reduce water and energy consumption, while promoting environmental sustainability.

Meryem Chtairi

Senior Manager Quality, Health, Safety & Environment
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