

Industrial Energy Efficiency Project Compressed Air System Optimization

Typically over 75% of the lifetime costs of compressed air system are energy related. This case reviews the optimisation of compressed air system at El-Dawleya factory, in order to identify opportunities for saving the energy consumption by that system. The study reveals compressed air system opportunities assessed in this plant, 288,275 kWh (or EGP 257,000) per annum could be saved in 2018 and then (EGP 320,000) onwards could be saved at a low investment cost.

EGYPT

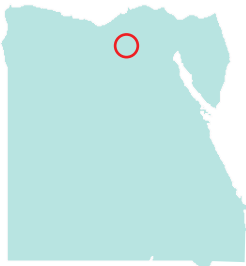
A Case Study of El-Dawleya Company

El-Dawleya Snapshot

Industry: Food

Location: Cairo,
Egypt

Product: juices and
drinks



Implementation cost: Low

System: Screw Air Compressors

Annual energy savings: ~288,275 kWh

Financial savings: ~257,000 EGP/year

GHG reduction: ~740 tCO₂eq (5 y)

Overall payback: Low

Juhayna Food Industries is one of the pioneer companies in Egypt working on the production of dairy, juice, and cooking products established in 1983 and has expanded its presence in the Middle East. El Dawleya is one of the largest industrial complexes in Egypt and the MENA region. Operational since 2009, this flagship manufacturing facility is primarily used for the production and packaging of fresh juices and drinks, including Juhayna Classics, Pure, Bekhero, and Oriental beverages.



CASO at El-Dawleya and the IEE Project

The Industrial Energy Efficiency Project (IEE) is a programme developed and initiated by UNIDO to promote energy efficiency in industry as part of its primary objective “promoting and accelerating inclusive and sustainable industrial development in developing countries and economies in transition.”

The Compressed Air Systems Optimisation (CASO) Project forms part of the IEE Project and has the specific objectives of developing local personnel to become competent in the application of energy efficiency in industry in order to unlock the potential for energy savings within their respective local industries.

El-Dawleya company is considered as a pilot plant for the IEEP in the CASO as well as other components. They are in the process of developing an Energy Management System (EnMS) with the assistance from the IEEP, and the CASO serves pretty well in developing saving opportunities for the company. It needs to reduce operating costs to remain competitive in the global market. The mandated electricity tariff increases have also contributed to this need to improve energy efficiency.

Since compressors consume a large proportion of electrical energy, El-Dawleya company has focussed on motor system improvements.

Summary of Optimization Strategies

Saving Opportunity	Energy Savings (kWh/year)	Financial Savings (EGP)	Capital Cost (EGP)	Payback (Year)
Compressor change between El-Dawleya & Egyfood	269,280	240,000	Low	Low
Load/Unload expanding compressor pressure setting	18,995	17,000	Low	Low
Total:	288,275	257,000	Low	Low

Case Description

The compressed air system at El-Dawleya consists of two separate networks. One network is to supply the whole factory with compressed air requirements and the other network to supply each of the plastic line separately. Successful implementation could realize energy savings but also serve as a stepping stone to realize more energy savings in other areas of production. The study focused on the analysis of network 1 only.

The major motor system (two screw compressors) consumption represents 15.6 % of the total electricity consumed by the company. The 2 screw compressors (compressor 1 and compressor 2) were identified as significant energy users consuming 10% and 5.6% of the utilities plant electrical consumption respectively.

The assessment involved reviewing process requirements, reviewing historical data, taking system measurements and developing optimisation solutions. This approach requires the engineers to develop a strong understanding of the system efficiency, operation and control conditions, as well as maintenance practices impact.

Optimization Strategies

Compressed air network 1 consists of Two identical Atlas Copco compressors 200 kW each is connected together. The two compressor are in service with different load/unload pressure settings. Two possible opportunities for energy saving in compressed air system were identified.

The first opportunity is to exchange the two Atlas Copco ZR-200 compressors, installed in El Dawleya, by One Atlas Copco ZR355 compressor, installed in EgyFood.

Operation of only one Atlas Copco ZR-355 compressor will be sufficient for El Dawleya factory instead of two ZR-200 compressors.

The second opportunity is to expand and reduce the load/unload band in compressor 2 from 8 – 8.6 bar to be load/unload at 7.3 - 8.3 bar.

Outcome

For the compressors system the company has to decide implement option 1 (exchanging the two existing compressors with the one installed in EgyFood) with total savings amount of 269,280 kWh (or EGP 240,000) per annum at a low investment cost.

Lessons Learnt

- Applying a structured approach to CASO can often realise with no or low cost requirements.
- This case only realises 10.1% of total electricity consumption.

El-Dawleya Company now realizes the potential savings as it has other motor systems at the plant that could also be epitomized. Using a continuous improvement approach it intends to realize these savings in future projects.

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