

Industrial Energy Efficiency Project Motor System Optimization

Electric motor driven systems globally consume approximately 70% of the electrical consumption in industrial sector. This case reviews the optimisation of motor system of a water cooling pumps system within a large industrial plant in the chemicals (fertilizer) sector in order to identify opportunities for saving the energy efficiency and consumption by the system. The study revealed that for the major motor system savings assessed in this plant save 345,000 kWh (or 172,500 EGP) per annum at an investment cost about EGP 80,000.

EGYPT

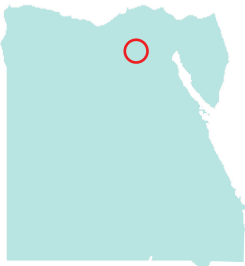
A Case Study of Evergrow Company

Evergrow Snapshot

Industry: Chemicals

Location: Giza,
Egypt

Product: Fertilizers,
relevant acids and
chemicals



Implementation cost: 80,000 EGP

System: Water Cooling Pump System

Annual energy savings: ~345,000 kWh

Financial savings: ~172,500 EGP/year

GHG reduction: ~ 188 tCO₂eq (10 y)

Overall payback: 6 months

Evergrow is competing with international companies in the local and international market and we ensure many assorted of healthy food that will benefit human being; not only in Egypt but also all over the world. Evergrow's annual production from the Abo Rwash factory is 60,000 Tons.

Evergrow specialized to produce Phosphoric, Sulphoric and Hydrochloric acids, Potassium sulphate, Calcium nitrate and Calcium chloride.



MSO at Evergrow and the IEE Project

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

The Motor Systems Optimization (MSO) 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.

Evergrow Company is considered as a pilot plant for the IEEP in the MSO as well as other components. The company is one of the pioneer companies in Egypt, working on the manufacturing of fertilizers. They are in the process of developing an Energy Management System (EnMS) with the assistance from the IEEP, and the MSO serves pretty well in developing saving opportunities for the company.

Summary of Optimization Strategies

Saving Opportunity	Energy Savings (kWh/year)	Financial Savings (EGP)	Capital Cost (EGP)	Payback (Year)
Installing VSD's	333,000	166,500	60,000	0.36
Upgrade motors from IE0 to IE3	12,000	6,000	20,000	3.30
Total:	345,000	172,500	80,000	0.50

Case Description

The motor system was chosen as a MSO case. The main significant energy users is the motor system that affecting on our plant electricity consumption. Evergrow have four pumps are being used to feed the cooling tower, only two are being used during the operations and the other two are on standby for any emergencies. Two operating Pump which represents 7% from our yearly electricity consumption before installing VSDs.

This system is controlled by manual valves and motor speed is fixed.

Optimization Strategies

Based on measurements and analysis of the data obtained from the system, we have identified the five possible opportunities.

First Install VSD's for motor system with low payback to maintain difference in temperature. Second replacing old motor IE0 by more efficient motor IE3 with medium payback.

Outcome

Motor and System Optimization for Evergrow's motor system include great opportunities to reduce its energy consumption with high attractive investment returnees. It is highly recommended to implement Install VSD's for motor system with investment cost is EGP 60,000 and payback period is 0.36 year with total annual energy saving 333,000 kWh, and total annual saving EGP 166,550.

Lessons Learnt

Using a systematic approach to motor systems optimization, Evergrow was able to identify low cost savings and was able to reduce their motor system consumption by approximately 7%.

In addition, Evergrow has saved the potential purchase of a new efficient motor and its associated life cycle energy cost.

Applying a structured approach to MSO can often realize with no or low cost requirements.

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