



MED TEST Case Study

## PETROCHEMICAL sector — EGYPT

# Egyptian petrochemicals company (EPC) – Chlorine plant

### Company overview

EPC is a large size petrochemical enterprise, affiliated to the Egyptian General Petroleum Corporation (EGPC). The company produces liquid and flakes caustic soda, liquid chlorine, Poly Vinyl Chloride (PVC) resins and compounds and sodium hypochlorite for the local market and for export (30%).

The company joined the MED TEST project to identify opportunities for increasing resource efficiency and productivity and reduce pollution loads to minimize investment/operational costs of the planned wastewater treatment plant. The project focused on the chlorine plant.

At project's start the company was already certified ISO 9001, ISO 14001 and ISO 18001. Through MED TEST, the company integrated cleaner production and resource efficiency into the existing ISO 14001 management system.

### Benefits

The MED TEST project identified annual total savings of \$US 530,638 in water, raw materials and fuel with an estimated investment of \$US 1,536,667. Some measures have excellent return on investment and immediate pay-back period. There are some identified measures being implemented by the company in 2011 and the remaining measures are planned to be implemented in 2012.

Total energy cost will be reduced by 37% through the use of excess hydrogen generated as a by-product from the chlorine plant as fuel. CO<sub>2</sub> emissions will be reduced by 9,500 tons/year. In addition the company is planning to apply a steam system survey to identify reductions in thermal energy consumptions.

Water costs will be reduced by 4% by applying good housekeeping measures and implementation of control system for water consumption.

MED TEST is a UNIDO green industry initiative to promote sustainability and competitiveness in the private sector in Egypt, Morocco and Tunisia. TEST integrated approach includes tools like resource efficiency and cleaner production, environmental management system and accounting, cleaner technology transfer and CSR.

**Learn more about TEST approach at [www.unido.org](http://www.unido.org)**

MED TEST is sponsored by the Global Environment Facility, the Italian Government and the MedPartnership.



**“The MED TEST project supported EPC to comply with environmental regulations, increase productivity and improve quality.”**

Eng. Ahmed EL BORDINY, Chairman

Environmental benefits would be reached in terms of reducing the wastewater pollution loads corresponding to 70% TDS annual loads due to an environmental investment project aiming at segregation, recycling and evaporation of high TDS streams from the process. Some trials are being studied for recycling the sludge generated from the salt purification process.

In parallel to the identification of saving opportunities, the company has updated the policy, actions plans and internal procedures related to integration with cleaner production and resource efficiency into existing ISO14001 management system. This will ensure sustainability of all the identified actions at company level as well as the development of new cleaner production projects.

## Saving opportunities

Measure	Economic key figures			Resource savings per year	
	Savings [USD/yr]	Investment [USD]	PBP [yr]	Water, Chemicals	Energy [MWh]
Good housekeeping	107 635	-	-	287 027 m <sup>3</sup> water	
Hydrogen recovery from chlorine plant	305 183	225 000	0.7		58 802
Filter press	69 150	500 000	> 5		
Water treatment unit	16 000	16 667	1		
TDS loads reduction	32 670	795 000	> 5	87 120 m <sup>3</sup> water	
<b>TOTAL</b>	<b>530 638</b>	<b>1 536 667</b>	<b>2.9</b>	<b>374 147</b>	<b>58 802</b>

**Good housekeeping:** The project identified several good housekeeping measure, such as: regular maintenance programmes, applying brine recirculation process, eliminating excessive floor washing and all sources of spillage and water leakages, and taking measures to avoid blockages of the wastewater channels by using screens to prevent brine impurities and solids from entering wastewater channels. The implementation of good housekeeping measures would save 3% of water consumption and achieve reduction of 9.2 tons/year (3%) TSS and 128.9 tons/year (1%) TDS.

**Hydrogen recovery from chlorine plant:** Hydrogen is produced as a by-product of the electrolysis process in the chlorine plant. Currently the excess hydrogen is flared in air after mixing with steam to prevent explosions. The reuse of excess hydrogen as fuel requires capital cost, but will allow significant reduction by 37% in energy consumption as well as in CO<sub>2</sub> emissions.

**Filter press:** The underflow of the clarifier is sent for dewatering and sludge separation to the filter press, which is in deteriorated conditions, causing leakage of filtrates in the work environment. The replacement of the current deteriorated filter press by a new fully automated one will prevent leakages of the brine solution to the work environment and reduce the weight of sludge and cost of its transportation to disposal by 30%.

**Water treatment unit:** Replacing the existing system with an automatic dosing system at the process water treatment unit will reduce chemical losses and consumption by 5% and subsequently reduce the hydraulic load of the unit.

**TDS loads reduction:** The site is experiencing a fluctuation in the levels of TDS pollution load generated by the chlorine plant. The company has started a project with the support of EPAP II funding scheme to address high TDS streams, which consists of several actions: recycling of the over analyzers flows (4m<sup>3</sup>/hr) back to the dissolution tank; design of a collection basin for segregation of the process streams with high TDS loads and installation of evaporators; installation of an on-line control system for in process recycling or discharge to the WWTP of the process streams based on their TDS concentration; and replacement of 10 pumps for effluent recirculation by new ones with closed cooling system. The implementation of these measures will prevent penalties associated to the fluctuation of TDS load, achieve water savings, maintain the effluent wastewater at 2000 mg/l TDS, reducing by 70% and 9,000 tons/year the TDS load discharged.



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