



Energy Conservation

A vision or a demand?

▲ By Hamad Qarzae & Omar Essa

Since the days of antiquity until recently, there has been an increasing pursuit for the mastering of energy and power. In any project development, it is very important to examine the lessons learned and experiences that occurred during its development stages until start-up. In the history of industrial plant development there are several instances of problems that had to be solved at tremendous costs personally and financially. A major contributor to these problems is energy related, where the installed equipment is either overly designed to meet production requirements or improperly configured and tuned for process automation, which may lead to unwanted losses of resources and energy. George Santayana couldn't put it any clearer when he said, "Progress, far from consisting in change, depends on retentiveness ... Those who cannot remember the past are condemned to repeat it."

In the design of a new and complex crude oil facility like a gas-oil separation plant (GOSP), it is important to plan the thermal energy balance: (1) Heat needs to be conserved and excess heat should be properly disposed of or utilized as a preheating agent; and, (2) equipment sizing and sparing philosophies shall be considered.

Saudi Aramco, as a leading global energy provider, has developed several best practices, procedures, and standards in its quest to remain a leader in energy conservation. In regard to the scope of the Capital Project's Energy Optimization Study, the Company's Engineering Procedure provides a clear reference that all new facilities and expansion projects in the existing facilities, where the overall energy consumption of the upcoming facility or new expansion exceeds 100 MMB-Tu/hr of heating/cooling, or 10 MW of mechanical power shall develop and conduct an Energy Optimization Study to review project design from an energy efficiency perspective, achieve energy efficient plant design, and ensure that every potential design improvement is captured.



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Badr M. Burshaid, manager of Marjan & Zuluf Increment Projects Department, said, “This collaboration among Aramco projects and EPC is the foundation of energy independence and has been a key contributor to achieving cost-effective and energy-efficient solutions and opening further doors to a wider Energy Conservation implementation in future projects.”

Marjan Onshore Oil Facilities Project, as part of its work, had conducted several assessments of potential energy optimization opportunities. The assessments recognized the relevant Saudi Aramco Best Practices and Procedures related to Energy Optimization. Such opportunities covered areas like:

- Heat Integration;
- Triethylene glycol (TEG) off-gas recovery;
- Motor optimization through replacing single speed drives with variable speed;
- Drives;
- Compressed air system;
- Utilization of condensed water from the gas compression units; and,
- Flare gas recovery.

Throughout the value engineering workshops, these items were evaluated further — energy savings were estimated and consequent net present value (NPV) savings were calculated.

One of the major energy optimization opportunities that have been exploited throughout the Marjan Onshore Oil Facilities project life cycle is the implementation of the

variable speed drives (VSD) to the gas compressor design. Given the high process envelope of the project design bases and operational cases, the approach led to an energy conservation with a high NPV. Also, the Marjan Onshore Oil Facilities Project exploited the opportunity of having the atmospheric compressor as part of the scope bases to install a flare gas recovery system with less CAPEX, which will lead to an energy conservation by further processing continuous flare gas.

Nasir S. Al-Abbas, senior project manager of Marjan Onshore Oil Facilities Project, said, “Value Engineering and Energy Optimization Studies are iterative exercises throughout the project life cycle as an open radar to capture potential opportunities of energy conservation and cost optimization.”

The above opportunities are only a kick-off of a greater mission led by Saudi Aramco to emphasize energy conservation as a factor in facility design and operation in addition to developing energy management programs with the objective of improving energy efficiency.