Easing the squeeze on profitability with effective energy management

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Reducing energy usage and associated greenhouse gas emission is a widely recognised business requirement for many process manufacturers and delivers tangible business benefits.

Less energy consumption is a key factor for commercial profitability and environmental compliance. However, if energy management is a significant objective with clear benefits, why are some manufacturers much better at it than others? For example, the least efficient refinery may consume as much as twice the energy required by the most efficient refinery to produce the same products (eg gasoline, diesel etc) from the same feedstock (crude oil). This discrepancy raises natural questions - why does this happen, what factors differentiate the best from the worst and how can refiners close the gap?

The answer is that effective energy management is not a one-off project or one area of the business. Energy management needs to be an integral part of managing and operating the plant to achieve optimum levels of energy whilst meeting production goals. However, many refineries and chemical companies fail to recognise that energy management needs to be an on-going commercial priority. The ability to visualise and analyse actual plant performance in real-time is essential to understanding energy usage and emissions and taking necessary actions. The notion that energy costs are fixed is a myth. They are a variable entity that can eat away profit margins and even affect plant performance.

By adopting a sustained approach to energy efficiency, supported by integrated processes and managed by leading-edge process optimisation software, companies have the ability to control and significantly reduce energy expenditures. Efficient savings made across the enterprise will positively impact plant profitability and, when margins are squeezed, this capability could mean the difference between commercial success and commercial failure.

Understanding where you are today

In the process industries, energy is typically the highest operating cost, second only to raw materials. Most chemical or refining processes experience significant variability in energy efficiency as a result of changes in process conditions, different operating strategies and poor control or visibility over wasteful practices.

When pursuing a comprehensive energy management programme, a basic starting point is to ask "are you doing all you can to drive down energy costs"? Many companies suffer from a lack of focus with regard to controlling energy usage because other priorities often take precedence. As a parallel example to illustrate this point, we observe what the process industries have accomplished in health and safety over many years. Health and safety has become the most important discipline in the process industries, to safeguard both personnel and the plant. Standards have risen dramatically over the past few decades and this is now seen as a vital practice that is embedded within the overall running of the operation. Therefore, what actions can process manufacturers take to elevate energy management to the same priority level and bring an energy management focus to everything that is done?

Plant energy management itself can be divided into two key areas - first, the reduction of energy demand and consumption in production processes, and second, the reduction of the supply costs of the energy used to meet the energy demand. An effective energy management plan must address both sides of this energy equation simultaneously, and from the initial planning of the operations to the minute-by-minute safe operation of the plant. Energy management must be performed by all key stakeholders who should be given the right tools and procedures for the job in hand.

Software supports effective energy management

In much the same way that all personnel need to be involved in energy management, companies also need to use every available means to improve energy efficiency and reduce costs.

Software technology can make a big contribution in helping companies to design, plan and operate their production facilities in the most energy-efficient way.

At the first step in the life-cycle of any production facility, software systems can help the designer to optimise the plant's design from an energy efficiency perspective. Many case studies have demonstrated that energy-efficient processes cost no more to adopt than inefficient ones because an energy-efficient process will require less hot utility (steam, fuel, etc) and also less cold utility (cooling water, refrigerants or air cooling). As a result, the utility equipment designed to service the production units, such as process heaters, heat exchangers and steam boilers will be smaller and, therefore, cost less to build and operate. In this respect, the on-going reduced operating cost is a bonus. Energy-efficient companies recognise this and now build energy reviews into each step of their design process.

Once the plant has been built, planning systems can help define both the optimal energy use and also schedule the utility system's operation to closely match the requirements of the production units, thereby reducing costly and unnecessary standby operations and ensuring the lowest cost purchase of external utilities. During plant operations, real-time software systems can both monitor the current plant operation against target, highlighting any deviation, and provide timely actionable

advice on the optimal changes that could be made and the value of making these changes on user-friendly interfaces, such as Distributed Control Systems (DCS) screens or web browsers.

For energy-intensive process manufacturing sites, such as an oil refinery, petrochemical plant or chemical plant, investment in software should not be seen as a cost barrier. In fact, companies of all sizes have experienced enormous energy cost reductions by using energy optimisation software solutions. According to a recent Gartner energy management report, one chemical company stated that 'five years ago, it was difficult to make the case with senior executives, even when improvements with good internal rates of return were identified. Today, senior leadership is on board and clearly understands that it needs to fund good energy efficiency initiatives when they come along'.

Many companies have successfully implemented AspenTech's aspenONE process optimisation software to achieve best practices for optimising their engineering, manufacturing and supply chain operations. aspenONE Engineering is a leading suite of software products focused on process engineering and design optimisation. Various process modelling analysis and design tools, such as Activated Energy Analysis, Economic Analysis, Rigorous Heat Exchanger Design and Rating and Aspen Fireheater are integrated and accessible through process simulators Aspen HYSYS and Aspen Plus. State-of-the-art forward-planning tools, such as Aspen PIMS, can help evaluate the trade-offs between production and energy costs, enabling a true optimal operation to be defined. Aspen Utilities provides the ability to both plan the optimal utilities system's set up and also advise operations personnel on actions they can take on a real-time basis, to improve energy performance and the subsequent value of those actions. Advanced Process Control (APC) software is intelligent technology that delivers sustainable, measurable benefits and allows companies to operate their facilities better. APC can increase throughput and improves product quality and energy efficiency, thereby delivering improved financial performance. By applying aspenONE solutions to the lifecycle of production assets, clients can typically save 10% to 30% energy cost while reducing 10% to 20% capital cost investment.

Prioritising energy management

Energy efficiency is fundamental to achieving a sustainable business, and reducing energy cost should be a key performance indicator for all process manufacturers. As global energy demand continues to increase and environmental regulations are tightening, initiatives to optimise energy efficiency are essential. The difference between those companies who are energy-efficient and those who are less so is the commitment to incorporate energy efficiency into everything they do. Consequently, this approach will help differentiate the organisation with best practice from the competition.

An effective energy management plan must be tackled holistically and integrated across all aspects of the business. To be truly energy-efficient, a clear action plan elevates the importance of energy management, defines the targets and timelines, tasks the workforce to execute the plan efficiently and maintains controls for the operation.

Equipping key stakeholders with leading-edge software delivers long-term benefits, by helping to reduce costs and improve the overall performance of the plant. In today's dynamic and competitive market, energy management is a key way to ease the squeeze on profit margins. The consequence of ignoring energy costs could be the difference between being commercially robust and profitable and not being in business at all.

APCChE 2015 to be held in Melbourne

The 16th Asia Pacific Confederation of Chemical Engineering Congress (APCChE 2015) will be held in Melbourne, Australia, from 27 September to 1 October 2015. It will be the largest gathering of chemical and process engineers and industrial chemists in the Asia Pacific region. The congress is held on a biennial basis.

The 2015 event will incorporate three conferences - APCChE 2015, Chemeca 2015 and for the first time, the International Conference of Coal Science and Technology (ICCS&T).

Congress Chair, David Shallcross said the theme 'Chemical Engineering in the Asia-Pacific Century - Growth and Innovation' will focus on the emerging opportunities and challenges for the chemical and process engineering industries within the region.

"Chemical engineers are meeting some of the world's most significant challenges for the 21st century - particularly in the areas of water and energy. The APCChE Congress will review progress and look at solutions to new challenges. It will provide a unique opportunity to learn of the latest advances and best practices in industry and academia", he added.

APCChE 2015 will include some exciting speakers and will provide an opportunity for chemical engineers and researchers to showcase their latest research and technologies. Each conference will run its own scientific programme.

Four main themes will be covered:

- Industry developments and directions (including industry best practice)
- Asia Pacific site operations (project case studies and multinational management approaches)
- Research & Innovation (new directions from across the Asia Pacific region, including coal science & technology as part of ICSS&T 2015)
- Professional development and education (including professional training 'taster' workshops)

APCChE 2015 is hosted by the Australian and New Zealand Federation of Chemical Engineers (ANZFChE), comprising the Royal Australian Chemical Institute (RACI), the Institution of Chemical Engineers (IChemE), Engineers Australia (EA) and the Institution of Professional Engineers New Zealand (IPENZ).