Energy efficiency: potential in oil and gas

By Elena V. Nekhaev,
Director of Programmes, World Energy Council

Energy efficiency has been making headlines for some time now. Any publication or discussion of energy-related matters inevitably makes some reference to energy efficiency. This is not without reason. If we look around, we see a wide range of devices which have significant potential for improving the efficiency of energy use. This potential is present throughout the entire energy value chain, starting from the exploration of primary energy.

For example, Oil & Gas (O&G), which is the most energy-intensive of all industries, has significant potential for efficiency improvements. O&G consumes about 20 per cent of its output for its own processes and, as reservoirs become depleted and extraction deeper and deeper, oil industry energy demand will grow even further. Moreover, the energy efficiency of O&G is very low by current standards, barely reaching 20 per cent. The industry needs to take urgent action to improve its performance in terms of energy efficiency and reduce its own energy demand. This will increase the profitability of its operations and improve its environmental performance.

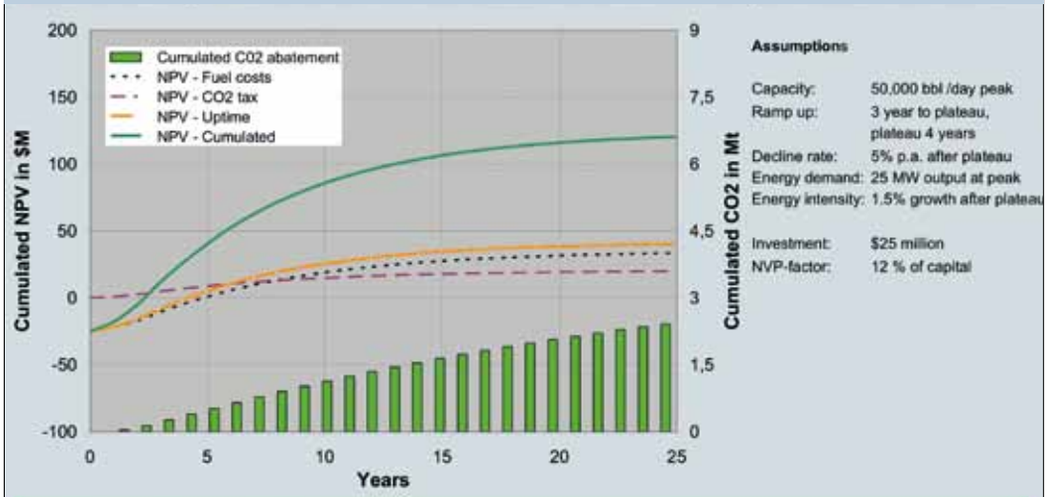
For example, a bottom-up assessment of energy efficiency top-down targets, such as Emissions, CO_2 Abatement, Profitability, Output and Cost can produce useful insights into the efficiency of the entire process. It helps evaluate the impact on energy efficiency improvements and develop a common understanding of drivers behind these improvements. It helps reduce fuel consumption, availability and profitability.

Measuring the impacts of energy efficiency

How can the impact of energy efficient technologies be measured and recorded? What savings can be achieved by deciding to use one appliance over another? To be able to answer such questions, it is necessary to define the reference point (baseline) to be used for measuring efficiency improvements. The baseline should also take into consideration 'business as usual' type efficiency improvements, i.e. the improvements that are due to take place anyway without adopting any specific efficiency measures.

Real energy savings are usually far less than what can be expected from technologies, often because of consumer behaviour (e.g. purchase of more efficient but larger refrigerators, higher indoor temperature and other so called 'rebound' effects). It is therefore necessary to study in more depth and detail the impact of consumer behaviour and consumer choices and promote technologies that can limit the impact of inefficient behaviour (e.g. speed limiters, thermal regulation of room temperature, automatic lighting controls in unoccupied rooms, light sensors, programmes automatically set to saving modes for washing appliances, etc). It is also necessary to provide tools to the consumers to enable them to manage their energy consumption better, such as informative billing or in-house display devices. One form of informative billing is to provide comparative

NPV of an incremental investment in uptime from 94% to 96%
30,000 bbl/d peak, US$50/bbl wellhead, US$25/bbl oe fuel, US$/t CO_2



Investments to improve efficiency and uptime may increase profitability and will abate million tones of CO_2

information that enables each consumer to understand the bill and compare consumption levels of similar consumers (for households) or similar companies (in industry and services). In the transport and household sectors, improving the efficiency of new equipment, vehicles and buildings is important, but it is equally important to maintain and service the equipment and vehicles to avoid a progressive loss of efficiency.

There are a number of different approaches the industry has developed, including the "All-Electric Oil and Gas" concept developed by Siemens. This concept offers better energy efficiency, higher plant availability and improved asset economics.

What's next?

Taking into account the many benefits provided by energy efficiency improvements, from reduced CO_2 to billions of dollars in potential savings from lower energy bills, it is surprising that energy efficiency still remains more a theoretical possibility than a practical solution. To achieve more progress in improving energy efficiency, communication and information should become first priority, even more important than incentives. This is where governments can and should take a much more proactive approach. All energy efficiency measures should be based on a cost/benefit analysis that includes environmental costs.

Energy efficiency must be considered as an opportunity not only for the technology suppliers but especially for the country and its industries which are using these efficient technologies. It is necessary to concentrate the investments on the existing technologies that are able to provide a fast payback time. Information, communication and education are essential instruments for spreading the energy efficiency culture.

In addition, it is fundamental to consider appropriate and reliable certification of energy consuming devices and the corresponding controls to minimise the risks which counterfeit products can create for the end-user. It is necessary to develop a culture that not only pays attention to the initial investment costs, but also takes into account the full life cycle costs, including operation and maintenance (O&M) and the costs of energy, which will become higher and higher during the technology lifetime. ❑

The "All Electric Oil and Gas" concept offers better energy efficiency, higher plant availability and improved asset economics

Efficiency	Asset economics	People shortage
• Lower CO_2 emissions • High efficiency (50+ per cent improvment) • Integrated heat generation (steam) • Concentration of emitting sources in one location (pre-requisite for CCS)	• Less fuel consumption • More hydrocarbons for sale • Improved asset productivity and availability (N+1, E-system management) • Payback of additional CAPEX as quick as two years	• Easier remote and unmanned operations • Less maintainance • More failure resilient (N+1, E-system management)

- Basic technologies available (adaptation to O&G environments required)
- Concept support Sustainability and Kyoto targets