



Two of the most important objectives confronting industry (and indeed society as a whole) are financial success and environmental responsibility – goals that are often perceived to be in contradiction. When it comes to energy however, whether electric or fuel, and whether in exploration, generation, distribution or usage, saved resources really do translate into saved money! This issue of ABB Review is dedicated to presenting how ABB technology can help customers improve their competitiveness through greater *energy efficiency*.



Energy efficiency – the other alternative fuel

Energy is the lifeblood of today's economy. From the extraction of raw materials, through manufacturing and transport to final usage, society relies on the continuous and predictable nature of its supply. Any threat to the availability of this resource can endanger local or even global prosperity. Furthermore, the world's thirst for energy is growing. Especially the highly dynamic emerging economies are set to account for a significant share of this global increase.

Facing this scenario, it is legitimate that all stakeholders are taking part in the debate over where this energy is going to come from. Relying on the traditional sources alone cannot be the solution: On the one hand, the indications for man-made climate change seem to be increasing, as is being reflected in ongoing events in global energy policy. On the other hand, access to these primary energy sources is increasingly developing into a political "tug-of-war", with different players struggling to secure favorable access. Furthermore, the implications of diminishing oil reserves cannot be ignored.

The obvious and most frequently fielded response lies in tapping new sources – whether variants of traditional sources or regenerative energies. Visionary future technology scenarios such as the hydrogen economy or nuclear fusion may be on the horizon, but the time scales required to realize these options are long, and tend to shift with time. Discussions over energy sources for the more immediate future are moving between nuclear, fossil and renewable sources.

Governments as well as non-governmental organizations, industry, research institutions and energy consumers have clearly accepted the challenge. New primary energy sources are being explored; coal is used in different ways; CO₂ sequestration is being evaluated; nuclear power is on the brink of a global revival; bio-fuels are being developed; wind and ocean energy is exploited; taxation or certificates are introduced as incentives for change and more.

Most stakeholders would agree that none of these answers can suffice in isolation. The answer lies in adopting a mix of most of the proposed solutions. However, the time-scale that the realization of any of these requires mean that immediate change is not around the corner. Is there an alternative that can deliver a fast solution while at the same time being economically viable?

Fortunately, this question can be answered in the affirmative: This "other alternative fuel" is energy efficiency.

Using less energy for the same tasks has the same overall effect on the global energy balance as the introduction of other alternative energies. While both roads have to be

taken, an increase of the efficiency of existing infrastructure can now be realized – and rather than leading to higher overall costs, the necessary investments are recoverable through operational economies. The savings start with the extraction of primary energy – in oil fields for example. A better control of the exploration process saves energy and increases recovery. The more efficient transport of energy from the primary source to the point of conversion offers further saving opportunities – for example through greater efficiency in pipelines and ships. The untapped saving potential is huge and addresses ecological as well as economic issues – a key incentive for its fast introduction.

The Carnot cycle in which thermal energy is converted to mechanical energy has a theoretical efficiency limit; research on turbine technology and combined cycles as well as better control processes can never surpass this limit but can push equipment closer to it. Transmission and distribution of electrical energy is not possible without losses in the lines, but high voltage DC and FACTS (Flexible AC Transmission Systems) offer excellent ways to reduce these losses. A major part of the world's electrical energy is consumed in electric motors. Depending on the application, the use of variable speed drives to run motors reduces energy consumption by up to 70 percent. Considering that the life cycle cost of a motor is up to two orders of magnitude higher than the initial cost for the drive, the energy saving argument gets a strong back-up from economic considerations.

The need for energy efficiency is huge and immediate, and ABB is dedicated to doing its part. Through almost all its products and services in the automation and power areas, ABB contributes to the more efficient management of energy.

In this issue of ABB Review, we present a broad spectrum of applications of ABB technology boosting energy efficiency. You will discover energy efficiency as the one "low hanging fruit" in the energy orchard where proven technology can be introduced immediately with very short pay-back periods.

We hope that reading this ABB Review issue gives you many ideas on saving energy: for your own benefit and for a better world.

Enjoy your reading.

Peter Terwiesch
Chief Technology Officer
ABB Ltd.