



Energy trends: facts and priorities

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Performance of Generating Plant (PGP)

Power plant performance is often overlooked in the political and public debates, as it is perceived to be too technical. However, it is a major factor for the electricity industry, in particular in developing countries, where performance improvement potential is particularly large.

Technology or management?

WEC has calculated that by improving the availability/performance of existing power generation park around the world to the performance levels currently attained by the top 25 per cent of plant operators, the power industry worldwide could save approximately US\$80 billion per year and avoid about one billion tonnes of CO₂ emissions (around 4 per cent of the total global CO₂ emissions). Moreover, this could be achieved at the cost/benefit ratio of 1 to 4, and would require only minor equipment replacements. Main savings would come from the improvement of operational practices and managerial decision-making. Analytical studies and documented practical experience demonstrate that;

- technology/mode of operation account for 20-25 per cent of the overall improvement, while
- human factors/management for 75-80 per cent.

Furthermore, even the most modern and efficient plants will not achieve their design efficiencies if they are not properly operated and maintained, hence training/capacity building is of vital importance to ensure that plants reach their operational potential.

Value of data collection and use

A recent survey of 450 executives representing 370 companies from 35 countries and 19 industries conducted by the Wall Street Journal has demonstrated that while business today is awash with data, only a few companies use data strategically and realise that the ability to collect, analyse and act on data is at the core of any company's competitive advantage. The survey identified a strong link between extensive and sophisticated use of data analysis and sustained high performance: top performing companies were five times more likely to single out pro-active use of data as critical to their competitive edge.

The analysis of plant's technical performance is one of the most important tasks at any power plant. Without its availability records, the plant staff cannot determine ways to improve performance of the equipment. Key factors influencing plant performance should be identified and evaluated to allow a cost/benefit analysis of any activity/programme before its implementation and upon its completion.

For many years, the WEC Committee on the Performance of

Generating Plant has been promoting international power plant availability data exchange and collecting availability statistics from countries around the world. Today the data is stored in an interactive internet-based database. The access to worldwide generating plant statistics provided by the database can help power plant operators benchmark their units using the availability records of their plants and comparing them with other similar units in the database. The ultimate objective of the database is to facilitate international exchange of information to improve the performance of power generating assets around the world.

Energy efficiency policies

Energy efficiency is a winning strategy which can help address a variety of policy objectives at the same time: security of supply, climate change, competitiveness, balance of trade, investment and environmental protection.

This is the main message of the forthcoming WEC report, produced together with ADEME and supported by Enerdata, based on input from 88 countries around the world. Improving energy efficiency can help:

- reduce energy imports and thus improve the security of supply,
- make up half of the reduction needed to reduce GHG emissions by 2050 in scenarios with strong CO₂ constraints,
- increase competitiveness of industries, especially for energy intensive industries, by reducing energy costs,
- limit the macro-economic impact of oil price fluctuations for oil importing countries in terms of balance of payments, and public budget,
- reduce the huge need for investment in energy infrastructure in emerging economies and free capital for other purposes,
- contribute to the environmental protection by reducing local pollution and deforestation.

To be successful, energy efficiency programmes and projects need appropriate strategies. The report introduces eight main recommendations to improve the effectiveness of energy efficiency policies development and implementation:

1. Incentive prices: a condition for successful energy efficiency policies,
2. Innovative financing to support consumers at a limited cost for the public budget,
3. Regulations need to be regularly strengthened, enforced and expanded,
4. Measures should be combined in packages of complementary measures,
5. The situation of less developed countries should be better addressed,

6. The achievements and impacts of measures should be monitored,
7. Consumer behaviour should be addressed as much as technologies,
8. International and regional cooperation should be enhanced.

Biofuels: policies, standards and technologies

The world's transport system is based on one single fuel – oil and today there does not seem to be any realistic alternatives to oil. Demand for oil is expected to grow for decades to come, and while biofuels can help meet this demand, they will not replace oil. The use of biofuels is growing strongly, although drivers for a wide deployment of biofuels vary across the world and include a broad range of issues from land-use to energy security, to economics and environment. The main challenge for the future is to develop biofuels which do not compete with the food chain, which are sustainable and efficient in terms of costs, energy use and the carbon footprint.

Technology is a key factor to enhance both food and bio-energy production and increase the output without adverse economic and environmental implications.

International Standards

Many barriers that today constrain world trade in biofuels can be removed by introducing international specifications and standards. Not only must properties of final biofuels products be harmonised but also methodologies for measuring these properties. The International Standards Organisation (ISO) is currently working on developing certain biofuels standards and the outcomes of this effort are eagerly awaited.

Outlook

Despite the projected tripling of biofuels production from 20 million tonnes of oil equivalent (Mtoe) in 2005 to almost 60 Mtoe in 2015 and over 90 Mtoe in 2030, their share in the total road-transport fuel is not expected to surpass 4-5 per cent by 2030. Biofuels production costs still remain comparatively high and substantial reductions are required for them to become commercially competitive.

Impact on food prices and land use

The spreading concerns about the impact of increasing production of biofuels on the food prices and possible competition for agricultural land require a holistic assessment since there are a number of various factors at play, including poor management of the agricultural sector during the last

decades, unfavourable weather conditions, lack of investment in production capacity and infrastructure, distorted agricultural markets and the dismantling of support policies for domestic market in developed countries which all might have contributed to the recent increases in food prices all over the world. The United Nations Food and Agriculture Organisation estimated in 2008 that globally biofuels accounted for approximately 10 per cent of the recent food price increases. In certain countries biofuels have had a more significant impact on food prices, however it was mainly because of national agricultural support programmes and protectionist measures rather than increased production of biofuels. The key success factors for the future of biofuels will be gradual expansion in cultivated land and considerable increases in agricultural productivity. This will require a broad political commitment, including introduction of badly needed land reforms, better irrigation, use of fertilisers and further development of transport infrastructure.

Interconnectivity

Our modern society could not exist without a reliable, clean and affordable supply of electricity. It has taken several centuries to develop electricity into its modern form and this development continues, as demand for electricity is soaring all over the world and new requirements, mainly related to efficiency or environment, are being introduced. In the vast majority of countries, the electricity sector used to be owned and run by the state, and it is still the most common arrangement. In terms of the electricity value chain, transmission on average accounts for less than 10-15 per cent of the final cost paid by the end-user for per kilowatt hour (kWh). However, today transmission is becoming a key issue for effective operation of liberalised markets and for their further development. An integrated and adequate transmission infrastructure is of utmost importance for ensuring the delivery of the most competitively priced electricity to customers, both near and far from the power generating facilities.

The development of interconnection capacity between two separate countries (or areas) allows greater flexibility in the generation mix. In particular, the availability of cross-border transmission capacity may help select power from cheaper units located in another area or country.

Market integration issues

Greater integration between different transmission systems increases the overall benefits, but it also requires a greater degree of harmonisation. The development of cross-border energy trading may increase dependence on the import and

create concerns about security of supply. This is a critical issue that affects the development of numerous large-scale projects. But there are good examples of successful policy approaches. Thailand, for instance, is negotiating long-term contracts with IPPs located in Laos. The hydro project Nam Theum 2 in Laos, with an installed capacity of 1,088 MW, is close to commissioning and nearly 90 per cent of its electricity production will be exported to Thailand based on a long-term Power Purchase Agreement (PPA). The peak demand of Laos was 415 MW in 2007, and it would have been impossible to develop the project only for the internal market.

Security of Supply and Climate Change

In liberalised electricity markets it may be more beneficial to invest more in cross-border expansion than in a centrally planned system. In this case the additional cross-border capacity may encourage generators to bid their actual variable costs and thus create a more competitive market. The larger the cross-border capacity, the less likely it is that large generators

can exercise market power. Thus, increased cross-border capacity can contribute to a reduction in prices through the reduction of market power. In any case, the increase in cross-border capacity helps improve the efficiency of the electricity system, since the merit-order dispatching system can achieve a better allocation with the increase of the generating power capacity that supplies the electricity system.

Some power grid interconnections can contribute to sustainable development, others can damage them. For electricity exporting countries, the construction and operation of power plants to feed an interconnection may have significant social impacts. Displacement or resettlement of population caused by new facilities (particularly hydropower) can lead to social impacts such as migration from rural areas to the already overcrowded cities, unemployment and other problems.

The many challenges posed by the necessary expansion of transmission infrastructure in different parts of the world are usually outweighed by the benefits that the interconnected systems bring to the consumers, both near and afar. □

More than US\$900 billion in infrastructure investments needed

Over the next four decades logistics bottlenecks are expected to occur almost everywhere in the World, if policymakers, industry and society are not able to find solutions in dealing with the impediments to reaching a global supply-demand balance. In its *Logistics Bottlenecks* report WEC has identified three crucial bottlenecks: oil movement, natural gas and LNG movement, and electricity transmission. To manage these expected bottlenecks, significant infrastructure investments need to be made in the next few years. To develop the required oil pipeline and tanker networks, gas pipelines and LNG carriers systems, as well as smart grids boosting the efficiency of electricity distribution, more than US\$200 billion will have to be spent in the next ten years and an additional 700 billion in the 2020–50 timeframe, signifying average annual outlays of US\$21 billion. Policies and concrete actions that allow for timely investments in the respective infrastructures and build bridges between the private and public sectors in various regions have to be designed and implemented. This will help ensure that the money is spent effectively, generating desired results for both companies, governments, and society. □

Projected requirements for gas pipelines and LNG carriers in interregional gas transport from 2008–50

