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## The challenges of a smart grid

It is no secret that South Africa's national power grid is under severe pressure, and the country's energy supply is unreliable and insecure. In Winter months the grid at times gets alarmingly close to the brink of shutdown. Power utility, Eskom, is faced with ongoing crises, and at the back of peoples' minds is the ever prevailing possibility of a recurrence of rolling power blackouts with which the country was beset in the later months of 2007.

A solution that can contribute to overcoming this situation is the 'smart' grid. The smart grid combines ICT and leading edge intelligence capabilities with existing electrical infrastructure to deliver real-time energy information and knowledge. It empowers smarter energy choices, and has the potential to transform the energy business and use of electric power throughout the world. It can without a doubt help support energy needs, significantly enhance electricity distribution, and generally create a more comfortable future.

The smart grid can help overcome the shortcomings of the existing power grid which are:

- the need for greater grid reliability, security and efficiency;
- the need for environmental and energy sustainability;
- and the need to empower consumers to manage their energy usage.

Clearly the smart grid offers numerous benefits. However, implementing the correct technical processes and leveraging the necessary skills to enable a smart grid, come with their own set of challenges.

"The challenges can be closely likened to a classic management problem," says Bradley Hemphill, Managing Director of EES, an ISO 9000 certified company, which provides management, engineering and technical auditing solutions to clients.

"Management needs a set of competencies, coupled to a set of processes and the application of the correct human behaviour. In a smart grid, competency can take the form of technology; process takes the form of our regulatory environment; and human behaviour equates to people."

**Technology:**

Technology is what is available to enable the smart grid strategy or process. Smart grid automation technologies, such as energy management systems and distribution management

systems, are required to help provide real-time knowledge and control over the distribution and transmission grid.

“The good news is that most of the technologies or components making up the grid already exist. However technology alone will not create a smart grid. The interoperability between the technical components needs urgent attention,” explains Hemphill.

**Regulatory environment:**
In addition to technologies, a regulatory environment is needed to allow a smart grid to exist. “The smart grid is a young market, and as a whole the regulatory environment is still in its early days and therefore needs to be developed more,” Hemphill continues. “National Energy Regulator of South Africa (NERSA) legislation, or the equivalent energy regulator in other countries, needs to be changed and updated to adapt to this new market.”

**People:**
Hemphill emphasises that people are the most important element when it comes to implementing the correct technical processes and leveraging the necessary skills. People need to change their behaviour and the way they think.

“We need like-minded people to engage and work together in conjunction with the national regulator, NERSA, to achieve a common technical and regulatory goal. People implement technologies, and without the right people speaking to one another or sharing the same common goal, the smart grid will not be achieved.”

**So where does ICT come into play?**

The two key areas, amongst many others, are Automated Demand Response and Cloud Computing.

**Automated Demand Response:**
The typical use of Automated Demand Response is to send information and signals to cause electrical power-using devices to be turned off during periods of high demand.

“In electricity grids, Demand Response is a dynamic demand mechanism used to manage customer consumption of electricity in response to supply conditions. An example is having electricity customers reduce their consumption at critical times or in response to market prices.

"It is becoming integrated into a dazzling array of technologies, from appliances to building management systems, blurring the line between energy management, demand response and ancillary services."

**Cloud computing:**

Cloud Computing is a technology enabler. It is the use of a network of remote servers hosted on the Internet to store, manage and process data.

"Cloud Computing offers previously unimaginable computing power, storage, connectivity, and other abilities that can be harnessed and leveraged in the creation of energy management systems," explains Hemphill.

Most applications, with the exception of real-time control, are suitable for the cloud. Some examples of smart grid applications that are today being moved to the cloud are:

- Storing, processing and accessing data collected from multiple homes
- Connectivity to end users
- Cloud-to-cloud integration
- Home monitoring and security
- A platform for applications to access data that can be further analysed

**It is all about collaboration**

"We need to combine technology, the regulatory environment and people, and collaborate to achieve this smart grid. Integral to this is having the right conversations, with the right people. We will not be replacing the existing grid, so it is necessary to start with existing systems and then progressively link them together by utilising ICT enabling technologies and intelligence capabilities," Hemphill concludes.

"It is only in doing this that we will be able to empower smarter energy choices, help support energy needs, and significantly enhance electricity distribution."

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**About EES**

Established in 2001, EES provides management, engineering and auditing services. As an ISO 9000 certified company, it specialises in the integration of multiple system infrastructure including ICT, Data Centres, Audio Visual, Life Safety, Security and Building Automation Systems. With over 175 successful projects to date, EES operates in the Renewable Energy, Oil & Gas, Financial Services, Infrastructure, Utilities, Telecoms and Mining sectors.

EES is committed to proactively assisting clients reduce their carbon footprint and facilitate the development of a 'green' commercial environment. With offices in Johannesburg, Cape Town and Stellenbosch, it plays a key role in mission critical environments in Africa. Having successfully delivered on numerous international projects, EES' clients, partners and stakeholders benefit from the company's global knowledge and expertise.