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SMART GRIDS EXPLAINED

About this Factsheet

This Factsheet provides an explanation of what a smart grid is and the benefits. It has been written in partnership with Tim Benson, freelance electrical consultant and member of ZAP Concepts UK.

What is a Smart Grid?

A Smart Grid is as an energy management system (EMS) that controls the generation, distribution and storage of electricity within a connected system.

This is profoundly different to typical energy systems at outdoor events, which are based on multiple autonomous units, for example generators or hybrid units in many locations, acting independently, often without the ability to monitor their loads in real-time.

How Smart Grids work

A typical characteristic of a Smart Grids is that it produces power through renewable energy sources to supplement the energy within the grid. The energy derived from renewables is stored and distributed as required in times of peak demand, when power outages occur, or as a means of reducing dependency on fossil fuel power generation.

This 'demand/response capacity' helps balance or match electrical consumption with supply. It is achieved through the integration of automated digital metering, for example smart meters and appliances, which record data on output and consumption. These devices allow two-way communication between all components of the SMART grid through a series of secure I.P. addresses, thus ensuring immediate responses to fluctuations in load demands and system faults.

Why are Smart Grids better?

The premise behind Smart Grids is that they improve the reliability, resiliency, flexibility and efficiency of the electricity distribution system, resulting in a vast reduction in harmful emissions. They also allow all areas of a community to become 'prosumers', that is both producers and consumers of energy within a community.

Efficiency can be significantly improved by using Smart Grids as stored energy can be used to provide for peak periods, reducing the size of generators required, and thus reducing fuel use. If energy supply and demand is monitored throughout a system, energy can be provided where and when it is needed. The ability to store and deliver energy also enables renewable energy sources, that may be intermittent, to be connected to a system, reducing fuel use and costs.

Although still in their infancy, the potential benefits of Smart Grids to event organisers can be summarised as:

- Reducing emissions.
- Reducing fuel costs.
- Integration of renewable energy sources.
- Providing instant and real-time feedback on energy production and consumption.
- Easy real-time diagnosis of faults.
- Efficiency – they can provide energy on a load demand basis, storing what is not immediately required for use by other consumers within their network.

Examples of Smart Grid at events

The use of temporary Smart Grids at events is relatively new. Enel, an Italian renewables provider, has teamed up with the Siemens' energy storage division to develop a portable, scalable Smart Grid to accompany Formula E to each of its urban race destinations. The grid's infrastructure includes solar panels and glycerine-fed generators connected to intelligent battery storage systems. Enel's web app and dashboards provide real-time feedback on energy generation, together with metering on consumption levels across all areas of the event site, including the pit lanes, VIP and public areas. The idea is to reduce dependence on local grid power networks.

Pukkelpop Festival (Belgium, capacity 150,000) used a decentralised energy production plan across one area of the site. All the electricity was generated locally through solar PV, biofuel generators and supplemented with battery storage systems. Where production exceeded demand, the unused energy was then stored ready to be distributed to other areas of the site where consumption levels fluctuated.