

Power Planning Pathway

An anticipated two thirds of power draw from non-stage demand at outdoor events. Food and beverage, bars, general vendors, site infrastructure and services all have a part to play in achieving an energy efficient event.

Greener Live Performances
through energy efficiency



To achieve energy efficiency at outdoor events you will need to use energy efficient equipment, and to carefully design the layout of your event sites to allow efficient power distribution and temporary power generator siting.

By being as energy efficient as possible, cost savings can be achieved through direct savings on mains power invoices or for temporary power; fewer and smaller generators, and reduced fuel consumption and costs.

Top tactics and considerations for energy efficient stage and site outdoor events include:

- Choose energy efficient equipment
- Choose the right size equipment for the job
- Know Your Power – what needs power, where and when
- Isolate loads with similar timing
- Right-size and right-site power generators
- Optimise generator loads for maximum fuel efficiency

This guide will help to identify ways to design-in an outdoor event site to become more energy efficient, with a focus on equipment choice and generator efficiencies.

Get AMPd!

The key to energy efficient site design and equipment choice is getting **AMPd!**

Achieving an energy efficient outdoor event means tackling power planning from the design of the event through to the delivery, and then considering power planning design every time you run an event.

Everyone has a role to play in this process. Event operators need to be armed with the knowledge on how to achieve reduced demand and equipment and power providers need to be able to supply solutions. Engagement and communications with power users needs to be clear and comprehensive.

Successful event design means devising systems and laying down protocols, and then ensuring that follow through takes place on the day with your on-the-ground.

We encourage all event producers to follow the Power Planning Pathway and to:

ASSESS: energy demand

MANAGE: plan-in energy efficiency

PERFORM: achieve energy efficient operations

DISCLOSE: measure and report

Making the Best Decision

When making a decision on the best design of power supply to your event, you'll need the following:

- Information on power demand for various power users
- Location of power users
- Timing of when power is require by various users
- Cost implications on having larger generators and more power distribution, versus several smaller generators with less power distribution
- Understanding of what permanent mains power is available and what would be the best power distribution for maximum efficiency of the event
- Engagement by the crew and a willingness to consider new site configurations or power supply
- Practical considerations must be included when making an energy efficiency decision for event operations. Some of these include:
 - Ensuring convenient, trouble free and time-saving sourcing of reliable power supply
 - Ensuring mobile power generator capacity will fulfil any likely demand, including equipment 'start up' or anticipated peak loads (everything being turned on at once!)
 - Logistical aspects such as access to place generators, generator noise concerns, availability

- of the correct sized generators by the supplier.
- Contracts that require dedicated generators, such as by specific band performing or for sponsor or bar activities.
- Distance on the site between power demand locations, especially applicable to events with camping.
- Cost implication of hiring multiple smaller generators or significantly more power distribution if using fewer larger generators, along with any consequential additional staffing costs.

Lighting and Visuals

To put power consumption of main stage lights into perspective, stage-related power consumption takes up about 1/3 of an average festival's power demand. Of this more than half of the main stage related power demand is from lighting, with 15% each to sound and visuals/video screens. ⁱ

The lighting and visuals of outdoor music performances is as critical to the experience as the sound quality and artist's delivery. Lighting design may be done for each performing artist, may be controlled by a lighting designer engaged by the festival, or may simply be an array put together by the AV supplier on a basic brief by the event organisers.

Whichever the scale, there are three critical

constraints the 'designer' is working within;

- creative production values
- availability of lighting equipment
- and of course, budget

To bring efficiency into the mix, the first action should be to give the lighting designer a power limit within which they must work – a power diet! This would be done in co-ordination with the knowledge of the availability of efficient lighting options and the financial viability of using them given the event budget.

Site lighting efficiency comes down simply to turning lights on only when it's getting dark, facilitated through manual connection or timers. Of course using energy efficient lights too!

Lighting Efficiency

Lighting efficiency can be measured in lumens per watt – the amount of light produced for the amount of watts used to power it. So when looking for energy efficient lighting, look for both measures.

LED lighting technology is increasing rapidly in its suitability for stage production lighting. Certainly par cans are rapidly being replaced by their LED counterparts.

Spotlights, floods and moving lights are all becoming increasingly energy efficient. Establishing an energy efficient lighting rig and design will come down to the availability of equipment, and the capability of the designer to work within a power diet to produce suitable effects.

Powering Down

All outdoor events need sound and lighting checks. The trick to energy efficiency here is being able to power down the lights and PA between sound check and show time. Schedule sound and light checks, if logistically possible, either far enough apart to allow a complete power down of the equipment and the mobile power generators, or close enough to show time to reasonably leave the generators running without wasting too much fuel.

Energy Efficient Generators

Energy efficiency is simply using less energy to achieve the same result. When using temporary generators, energy efficiency means maximum kWh of power produced for minimum litres of fuel used. This can be achieved through using well-maintained fuel efficient generators which are correctly sized for the job.

Generators are sized based on their potential power output, (kVa). Efficiency of power output to fuel consumed will depend on the age and make and condition of the generator.

ⁱ Festivals and sustainability: reducing energy related greenhouse gas emissions at music festivals. Dr Ben Marchnini/DeMontfort University www.dora.dmu.ac.uk/handle/2086/8840



Fuel consumption becomes more efficient as the generator is run at the 'optimal load zone' of around 70 to 80% of its capacity potential. Energy efficiency therefore comes down to doing generator sizing, siting and distribution in such a way as to have loads in the 70 – 80% load sweet spot.

'Powerful Thinking' - a UK Think-do tank on sustainable energy at festivals and outdoor events - produced the report 'The Power Behind Events'. They found that 60% of generators studied at UK music festival were more than double the capacity really required. Of the generators monitored at 8 events, every single system had periods of working below 25% load. Some of them operated entirely below 25%.

Isolating Loads

Very often production values and requirements cannot be compromised as they are part of the event and entertainment experience. In this case, the biggest efficiency action that can be taken is to configure power distribution so the generator can be completely powered down. Simply switching off the generator will mean it uses less fuel. The key is to identify equipment that needs power at a certain time, and to distribute that power all from the same generator.

For example, if you have a generator which is running a stage's lighting and sound requirements, and the adjacent bar's operations, this generator will need to be sized to provide adequate capacity for power needs of both operations. This will be great during the main running times of the event and performances, however, if there are significant breaks in the performance times, or if the event is multiple days or just 'bumped in' the night before, the generator will be running all night long just to power the refrigeration units of the bar. The solution would be to have two smaller generators being used for separate functions.

Distribution

Distribution is the way that electricity gets from the generator to the power users and does so via a Distribution Board. 'Dizzy' boards, as they are commonly known, come in a single phase and three phase. Site electricians will configure the location and number of dizzy boards based on generator location and user requirements. This piece of equipment is a vital player in the power provision to your event as the effective and efficient distribution of the generator's power capacity to power users is key to energy efficiency outcomes. It is also worth noting that many dizzy boards require forklifts to move them, further adding to the fuel consumption of electricity set up. Look for kit which is able to be moved by hand, trolleys, pallet jacks etc.

Sizing and Peak Loads

If you install kWh power metering on your mobile generators you will see that the kWh of power being drawn down will ebb and flow throughout the day. When everything requiring power is switched on at the same time, a peak demand load is drawn from the generator. Understanding the timing of these likely peaks and configuring power distribution amongst generators will help to ensure there are no power failures and also allow the most efficient sizing of generators to be placed.

Another related concept is the peak power draw that an individual piece of equipment will use upon start up. Lighting and visual effects equipment may need a 'warm up' period, where power draw is significantly higher than the general operating of the equipment. This is also experienced in catering equipment such as deep fryers and anything that needs to bring liquid to boiling using an element.

Stage power generators will be sized to ensure it is able to cover all potential power demand. By working with lighting designers and operators a true picture of power demand can be painted, and actual peaks identified.