

# Blue Diamond 60kVA

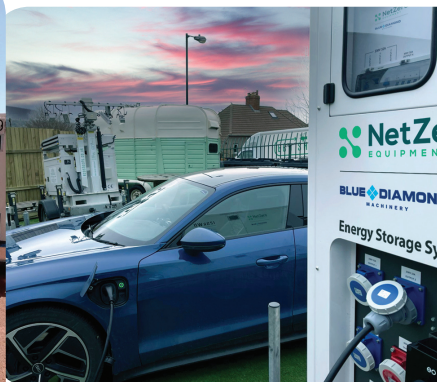
## Hybrid Power System



Blue Diamond's Hybrid Power System is ideally suited to a range of applications, delivering reliable power in the most cost effective and environmentally sensitive way. Energy stored within the unit is converted electronically into AC mains voltage. Power can be derived from solar PV, connection to an external grid supply or from a diesel or hydrogen generator and wind turbine.

400/230V 50Hz 3Ø output, 60kVA  
Deep cycle automotive NMC Li-Ion battery  
100kWh stored energy

Full system DC isolator with pre-charge  
200A pass-through capacity  
Advanced EMS with touch screen control  
V50 Power™ for enhanced DC bus stability



To find out more on Blue Diamond's range of renewable equipment visit: [www.netzeroequipment.com.au](http://www.netzeroequipment.com.au)



## SPECIFICATIONS

Output (400/230V 50Hz 3Ø):		Instruments, controls & connections:	
Continuous ac (Inverter)	60kVA	Input connection (AC1 & AC2)	IEC 60309 or hardwire stud
Inverter peak power (5 seconds)	120kW	(AC2)	3Ø 400V IEC 60309 or hardwire stud
Pass-through capacity	200A	Output Connections AC	3Ø 400V IEC 60309 or hardwire stud
Input:		Battery condition	✓
AC1 Maximum input 3Ø (Option)	200A	System status control panel	✓
AC2 Maximum input 1Ø	125A 230V	Battery condition	✓
System bypass capacity	200A	Battery main isolator	✓
Dimensions:		Input & Output MCB's	✓
Length	2000mm	Programmable gen auto-start signal	✓
Height	1960mm	Optional features:	
Width	1195mm	Integrated MPPT Solar PV charge controller	• PV
Ingress protection rating	IP34 Suitable for outdoor use	System AC bypass up to 630A (in lieu of standard)	• BPS
Standard Finish	Epoxy Powder Coat RAL 9016	Single to three phase conversion	• PC
Noise Levels	Inaudible above background	Harsh environment pack	• HE
Maximum heat rejection	12kW	Free air cooling pack	• FA

## STANDARD BATTERY SPECIFICATION

Battery Type	Li-Ion NMC
Battery design life	4000 cycles to 80% dod
Nominal Battery Capacity	2200 Ahs
Useable stored energy (energy available at AC socket)	100kWhrs
Total unit weight (TBC)	2390 kg



supporting limited capacity grid to supply EV charging points.



Specifications may change without prior notice. E&OE

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# Hybrid Power Systems

The science behind the technology

## Introduction

The principle behind the concept of hybrid power generation is quite simple and easily understood. There is a common miss-conception that hybrid generation is a case of 'robbing Peter to pay Paul' but this is not so.

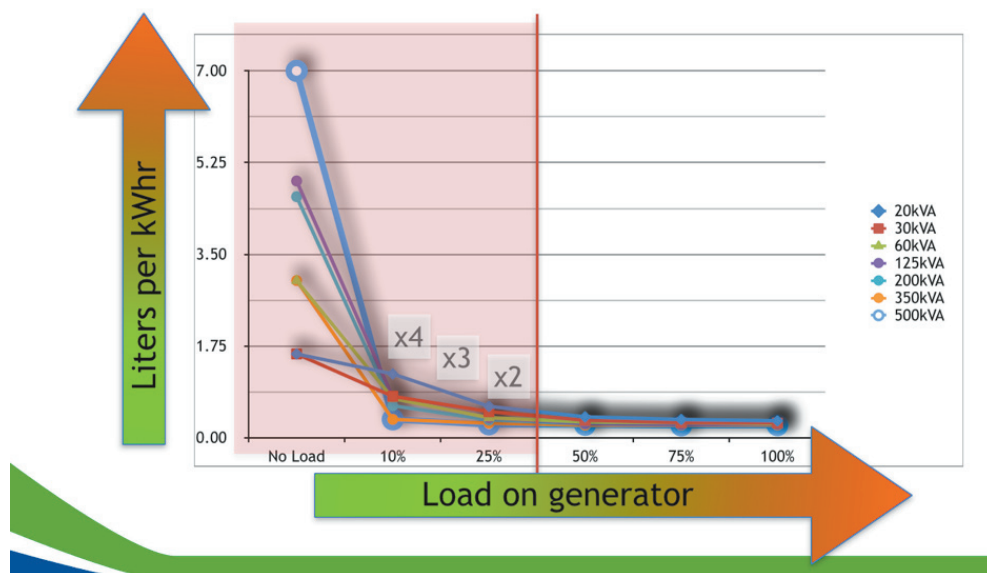
It is widely understood that driving a vehicle in an urban environment (ie: stop start and at slow speed), delivers poor fuel efficiency. The same applies to diesel generators which, after all, are based on the same internal combustion engine technology as a car or truck.

POWERCUBE, manufactured in the UK, is a hybrid power centre that is used in a variety of ways to deliver an alternative to running a generator 24/7 and so delivers significant savings in fuel consumption, reductions in emissions and other benefits. This is an overview of the principles behind the core technology and describes how and where benefits can be achieved.

## Generator Fuel Efficiency

For all generators, regardless of fuel type, a relationship can be drawn between fuel efficiency and load. This will vary for different fuel types. Diesel generators are by far the most common so we will focus on the characteristics of diesel generators.

What we are concerned with is fuel consumption in litres versus output from the generator in kWhrs, (ie: litres per kWhr). The table below illustrates the relationship;



There are two things that the curves above show: Firstly, that fuel consumption, for loads above 30%, increases proportionally to increase in load and that litres burned per kWh is much the same regardless of the generator's size. Secondly, that fuel burned per kWh generated increases exponentially as load drops below 30%. As a footnote, it is also known that lightly loaded generators run cooler and so the level of particulates and pollution generated per litre of fuel also increases.

## In conclusion, generators that are lightly loaded burn more fuel, less cleanly for every kWhr of electrical energy generated

### How does a hybrid system make this better?

In most situations, the electrical load on a generator is not constant; many electric loads turn on and off and those that are steady tend to consume low levels of power. The result is that a generator will see short periods of high power demand and longer periods of low power demand.

In a hybrid system, the generator turns off when there is less work to do and, when demand for power is higher, the generator turns on. When the generator is on, it is made to work harder by charging a battery so that energy can be stored. As a result, the generator runs less and works harder when it is running; less fuel is used and is burned more efficiently to generate the same amount of energy.

### Less fuel, less CO2, Lower emissions, Less noise

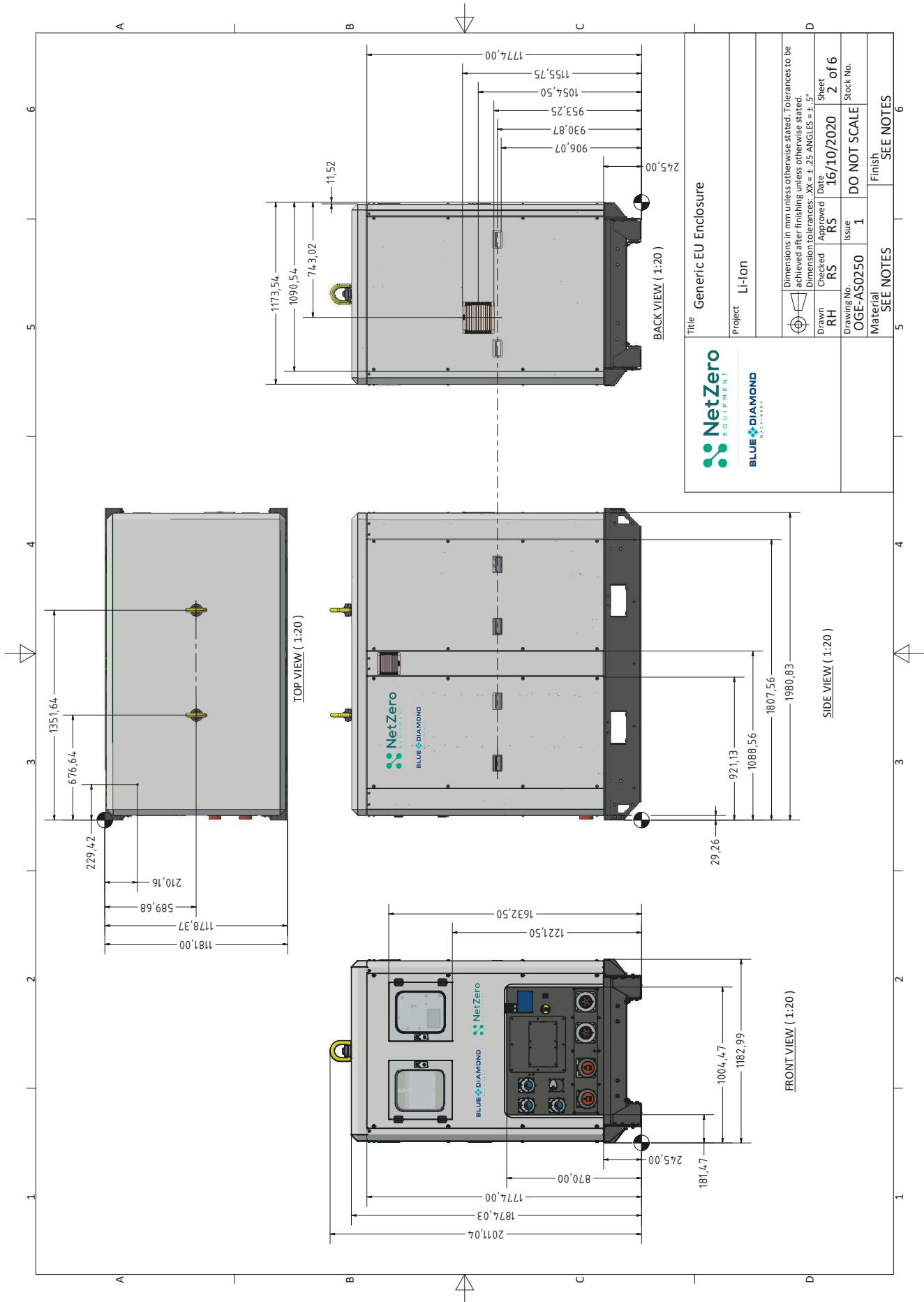
#### Benefits quantified:

If we look to quantify the benefits that are achieved as a result of employing hybrid technology in temporary power systems, there are gains on many levels:

- 1) Fuel savings: Reductions in fuel consumption have obvious benefits that starts with a lower cost of fuel. Reductions will often be as 30-40% and can be as high as 80% depending on circumstances. In many cases, the cost of refuelling is just as significant and may even be greater. Less refuelling also means fewer road journey to deliver fuel so savings are made there too.
- 2) Lower emissions: Less fuel consumed means less CO2 created. There is a linear relationship where every litre of fuel saved reduces emissions by 2.65kg's of CO2. Pollution including NOx emissions are also reduced where the level of pollutants relates to the efficiency of combustion. Lightly loaded generators run cooler and burn less efficiently so create more pollution. For an installation with a 100kVA generator, modest savings can equate to the same as is produced by 20-30 family cars.
- 3) Noise reduction: For some installations, in sensitive residential areas for example, noise reduction/elimination ranks very highly in terms of environmental benefits. Enabling sites to operate longer hours or reducing nuisance or complaints can have significant benefits. It would be possible, for example, for a construction site to have the main generator turn off at the end of the working day and have the hybrid system to support the basic night-time loads through to the next morning without noise.
- 4) Longer generator life; less service: Another benefit of utilising hybrid power is reduced running hours of the generator. Fewer running hours means less need to service the generator saving cost and reducing the waste materials (oil, filters etc) that are created. Furthermore, the fact that the generator will be working harder results in better working conditions and greater reliability so longer service life.
- 5) Resilience and security: Where hybrid power provides dual sources of energy (generator and battery) an added dimension to the solution is increased power security and enables switching between power sources without loss of power.
- 6) Integration of renewables Hybrid technology also works as an energy

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