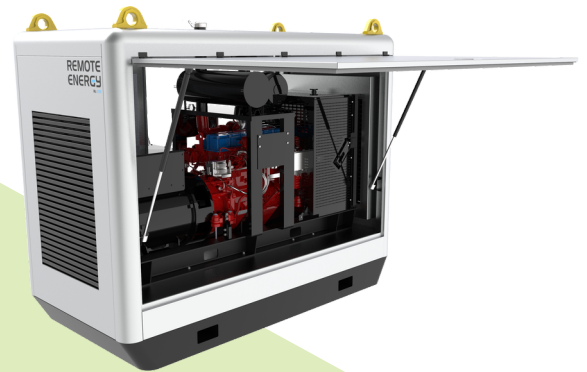
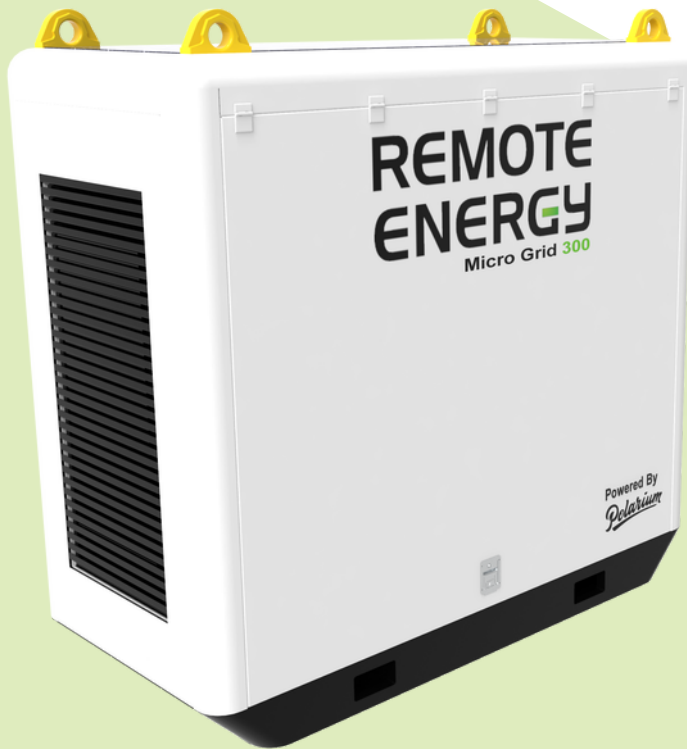


hybrid generators



case study

If you're serious about environmental change, choose a fuel of the future - 100% hydrogen or hydrogen injection

Hydrogen solutions are ideal to convert traditional technologies into greener solutions, with a significant cost saving and a low environmental impact.



today's world

Today's energy grids are facing an unprecedented set of challenges, a need to move away from fossil fuels towards renewable energy sources, accelerated demand due to the increased electrification of homes, industries and electric vehicles and consequently infrastructure instability.

Renewable energy sources are estimated to lead the power generation mix, reaching 80-90% by 2050. Global Conferences like Cop27, the UN Climate Change Conference held from 6 to 20 November 2022 in Sharm El-Sheikh, Egypt have identified the increased attention and the commitment of countries and their governments in common environmental targets.

With the availability of cleaner solutions or by simply consuming less fossil fuel, since it is expected an increasing trend in fuel costs, which will have the biggest impact on those industries such as construction and mining.

In this phase of global transition to move away from fossil fuels to use of alternative fuels sources such as biofuels, hydrotreated vegetable oil (HVO), Hydrogen and energy storage systems (ESS) are the common denominator that enables alternative technologies to be used. These systems deliver clean and efficient energy solutions across a wide range of commercial and domestic applications.

The demand for sustainable fuels is projected to triple over the next 20 years. Sustainable fuels, including biofuels such as HVO will be an interesting alternative to today's use of diesel also in terms of costs saving. HVO will soon be locally produced and readily available right here in Western Australia.

A large chunk of the greenhouse gases that blankets the Earth and trap the sun's heat are generated through energy production, by burning fossil fuels to generate electricity and heat. The science is clear, to avoid the deleterious impacts of climate change emissions need to be reduced by almost half by 2030 and reach net-zero by 2050.



current technology

Total investments across energy sectors are expected to grow rapidly per annum and are projected to be increasingly influenced towards non-fossil and decarbonization technologies. Hybrid configurations are the perfect solution to convert traditional diesel fossil fuel technology into a greener solution, with lower environmental impact, high performances and cost saving in the long run.

Hybrid power systems manage the operation of diesel generators, which often operate at a low load. The fuel economy of diesel generators is not efficient when working at low load since more fuel is consumed at 10% load to generate one kilowatt hour of energy, compared to working at the optimal 50% load or above.

With the EPAH hybrid system, when power demand is low the generator power management system (PMS) automatically detects this and it is shutdown so that the battery supplies the power. When the battery runs low or power demand increases the PMS again automatically detects this and is turned on, supplying the additional power required and the excess charging the ESS. With this technology, the generators only run when strictly necessary and in the most efficient way with no low load glazing of the engine. The result is fewer running hours, more efficient consumption of fuel, less emissions, less maintenance, less refueling all resulting in money saved.

EPAH hybrid generators are a mobile all in one ESS with varying enclosure configurations for mining, constructions, events, utilities, remote off-grid and LV/HV EV charging solutions. In hybrid mode, this technology is equivalent to or superior to any diesel generator. In any demanding application like mining and construction sites, where low loads and/or peaks can be a problem for the generator, the hybrid solution is ideal to improve the overall performances of the site and protect vital infrastructure. In a worksite for example, these systems will work also for peak load shaving/sharing, reducing power consumption for short time periods to avoid excessive consumptions.



current technology continued

The team at EPAH pride themselves on leading the industry by combining the latest technology, performance and reliability by expanding and diversifying its range of products on offer to keep pace with the times and meet the new requirements defined by governments and the market. The EPAH hybrid generator range is a battery ESS that allows the storage of energy from multiple sources being the generator, solar, wind or the grid. Energy can be redistributed as and when required at a later time to a site that requires power. When one of our hybrid generators is deployed to any site it is possible to have a cleaner, greener solution that can power the site during those periods of low energy demand, such as overnight or during the weekend. This allows customers to utilise reliable, green, clean energy in almost any application. The all-in-one units comprise of the generator, ESS, power management system and onboard fuel, don't be fooled by others claiming to have "hybrid generators" that are simply battery ESS that still require a stand alone generator and fuel tank. Why transport and store 3 pieces of equipment when you can have it all in one safe reliable efficient unit.

Our hybrid generators have the ability to monitor all parameters remotely over the internet as well as the ability to parallel seamlessly in multiples up to 16 units, also the ability to combine with our MG300 Micro Grid series for larger applications that can provide up to 160kVa @ 480V with 300kWh each of useable capacity that can be connected in parallel with multiple units up to 1mW or more.

In addition to environmental benefits deriving from the use of hybrid solutions, it is possible to have a significant costs optimisation for rental customers.

every project. one planet.

results

With the solutions in hybrid mode, users can reduce fuel consumption around 50% with a reduction of CO2E from 50% to 90% during operations when generators are correctly matched to the required power demand/load.

In the example below, a cost saving analysis with a comparison between 4 potential site setups.

Column one, standard diesel generator running the site in a conventional manner fuelled by diesel running 24/7.

Column two, hybrid generator power solution fuelled by diesel combined with a battery ESS.

Column three, hybrid generator power solution fuelled by HVO combined with a battery ESS.

Column four, hybrid generator power solution fuelled by diesel with an optional Hydrogen injection kit installed.

110kva 50% reduction example

Standard diesel generator		hybrid power solution		hybrid power solution fueled by HVO/bio fuel		hybrid with HYDI kit	
data		data		data		data	
hire period (days)	60	hire period (days)	60	hire period (days)	60	hire period (days)	60
generator runtime (hours)	1,440	generator runtime (hours)	1,440	generator runtime (hours)	1,440	generator runtime (hours)	1,440
silent runtime (hours)	0	silent runtime (hours)	720	silent runtime (hours)	720	silent runtime (hours)	720
Fuel consumption (litres)	37,440	Fuel consumption (litres)	18,720	Fuel consumption (litres)	18,720	Fuel consumption (litres)	15,840
CO2E output (KG)	43,690	CO2E output (KG)	21,845	CO2E output (KG)	2,599	CO2E output (KG)	17,479
CO2E reduction (%)	0	CO2E reduction (%)	50	CO2E reduction (%)	90	CO2E reduction (%)	60
Fuel cost (\$2/l)	\$74,880	Fuel cost (\$2/l)	\$37,440	Fuel cost (\$3.12/l)	\$58,406	Fuel cost (\$2/l)	\$33,120
hire cost	\$7,200	hire cost	\$13,200	hire cost	\$13,200	hire cost	\$14,400
total cost	\$80,080	total cost	\$50,640	total cost	\$71,606	total cost	\$47,520

NB: Average 110kVA diesel generator uses 26L/hr at 75% load and up to 33L/hr at 100% load.

Hydrogen injection on average reduces diesel usage by 10% whilst reducing DPM emission by up to 80%, 22% less NOx, 25% less CO and 8% CO2.

results

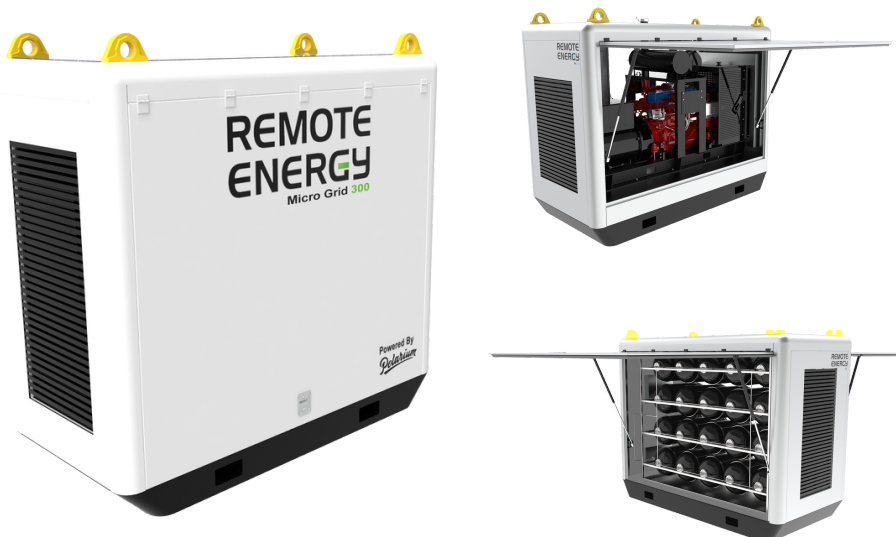
From the analysis, the monetary and emission savings from our optimised hybrid generator range offers vs an industry standard diesel generator is clear. This figure is even more evident when an extended period is considered, for example over a 12 month period the total that could be saved is around \$227,760 with a reduction of 50% in CO2E output.

A further increase in savings of around \$254,040 (even with a higher hire cost) with the optional Hydrogen Injection (HYDI) system installed on the hybrid diesel generator with a further reduction of 60% in CO2E output.

The hybrid generators fueled by HVO only compound these statistics with the higher hire cost considerably counterbalanced by the financial savings as well as significant CO2E reduction of around 90%. All EPAH hybrid generators are ready to run on HVO if required and available resulting in greatly reduced emissions.

In light of this data, the hire cost has to be considered in relation to the generated savings, confirming that these solutions provide an immediate decrease of costs for our rental partners, while obtaining optimal performances and low environmental impact.

This is what makes our product range so competitive at an overall lower total cost, it is possible to increase sustainability, meeting your esg targets with one highly performing solution.



greener fleets. lower costs.