

aggreko

MINING

Hybrid systems

The future of mining power



Hybrid power for your mine

When it comes to power, one way miners can improve efficiency and bottom lines massively is through the implementation of hybrid power.

As mines are going deeper and more remote than ever before, finding innovative ways to keep costs and emissions in check is an ongoing challenge. Hybrid power plants combine the advantages of renewable energy and battery storage with the reliability of thermal generators. Once installed, the costs of producing solar power are almost zero - and so are emissions. Our battery storage system gives you greater power quality and resilience and also delivers savings to your project, by improving the overall plant efficiency and thereby reducing fuel consumption and carbon emissions.

Our hybrid solution will provide your mine with the dependable energy your productivity hinges on - while your costs and carbon footprint will shrink in the process. The cost of energy from solar-battery-thermal hybrids is significantly lower than it would be from purely thermal generation. Savings relative to thermal generation is about 20%* and CO2 emissions are reduced by 10-30%*.

This allows you to concentrate on your mining operations, secure in the knowledge your power supply is in the hands of the leading specialist modular power company.



BENEFITS OF HYBRID SY



Renewable Power

- Low cost of energy
- No fuel costs
- Low O&M costs
- Long service life
- Zero emissions
- Supporting ESG targets

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Future-proof technology

In today's fast-evolving energy landscape, long-term commitments may lead to stranded assets and tied-up capital – especially with relatively new technology.

That's why we offer a risk-free, 100-percent reliable solution, addressing your immediate requirements and tapping into revenue opportunities. Our rental agreements give you maximum flexibility, ranging from a few months to years and are based on a fixed monthly or annual fee. The rental model also frees up working capital for more profitable uses without increasing the debt ratio and offers the ability to ramp up or scale down power requirements giving miners control over the varying demands throughout the life-cycle of a mine.

No matter where your mine is or how deep you go, with our hybrid solutions you get the power you need - whenever and for as long as you need it.

SYSTEMS IN A MOBILE AND MODULAR DESIGN

Battery storage



- Enhanced quality of power
- Dependable black-out prevention
- Safe Renewable integration
- Maximum plant efficiency
- Reduction of overall cost



Thermal Power (diesel, gas or HFO)

- Reliable 24/7
- Fast response
- Controllable
- Low cost of capacity



Key facts

- 24/7 Availability of reliable power
- \$0 No upfront capital outlay
- 5-20% Savings from the first kWh
- Bundled in a single contract
- Contract durations from 3-10+ years

Partner with **Aggreko** to solve your power problems

We have delivered power to the mining industry for decades. But just because we are silver backs in the industry doesn't mean we keep repeating what we've always been doing - on the contrary: what we bring to the table is our ability to adapt technological progress, constantly striving for innovative ways to deliver better and cleaner power solutions to you.

Our hybrid power plants can deliver the cost and emissions reduction that you need, without compromising on energy quality - but that is only half the battle. We partner with you to deliver mobile and modular power packages that fit the requirements of every individual project - a one-stop service that provides everything from one supplier. Here is how we can support you:

Uninterrupted power to maintain your mining operation? You can count on us.

Traditional contingency plans use thermal generators running at low loads as a back-up. But a backup generator requires a constant supply of fuel that adds to your costs. We've devised a more efficient way by bringing in battery storage to the mix.

Our battery storage takes less than a single second to kick in and begin providing power - helping you avoid costly losses in the face of potential breakdowns, blackouts and unplanned maintenance.

By using battery storage instead, you will save the cost that you would normally spend on fuel, while still benefitting from seamless and uninterrupted back-up power.

Looking to decrease your cost of electricity? We optimise your thermal assets.

Thermal-only systems offer a high degree of reliability and power quality. However, in order to be able to react immediately to sudden load changes or generator failures, some generators are constantly running at a sub-optimal load. That way they keep headroom for the provision of spinning reserve.

It can activate within milliseconds and replace the spinning reserve of thermal generators, and provide a high level of continuous power to your system, no matter what. This allows us to operate our generators at optimal load points, resulting in higher fuel efficiency and lower CO₂ emissions.

Sharp rises in power consumption? Here's how we'll protect your equipment - and your energy bill

Abrupt changes in your load or block-loading requires high transient response capability from thermal generators. But to be able to quickly adjust to new power setpoints, generators need to operate at a low to medium load, which is not very efficient. There is a better way.

Our battery storage systems are proven to provide transient response in milliseconds, far quicker than a thermal option. Combined with thermal generators, they provide the high quality power you need.



Reduce your carbon footprint

There are plenty of ways we can help you do it.

Regulations are consistently being introduced to reduce emissions, which are driving mining companies to evaluate their power strategies. We partner with you to identify more efficient ways to not only produce, but also consume energy.

The mining sector is different to most. Remote locations and limited access to the grid means that diesel generation is routinely the first choice for a mines power supply. However, renewable energy has become an economically attractive alternative in recent years. And when combined with thermal generation and battery storage, it is a more reliable solution than thermal only. Another advantage: Solar power and battery storage doesn't burn a drop of fuel, which can offer some degree of independence from volatile oil prices and vulnerable global supply chains.

Overall, your mine can keep aligned with new regulations and save costs in the process – while still enjoying uninterrupted power.



Our products

Thermal generation

We have the world's largest fleet of mobile, modular power generators with about 10 GW in our fleet.

Our generators are built in 20-foot ISO-standard containers, which means they can be transported using standard methods - that saves time and money. And because we have designed them in a range of capacities we can scale our power to your unique needs, so you get what you need, how and when you need it, and if those needs change, then we can scale our provision up or down to suit.

Our generators run on gas, diesel or HFO, as well as hybrid resources, according to what you need. They are sound-attenuated, available in 50 or 60 Hz and with safe-ALL containment bases that prevent fuel spillage. We also provide flexible fuel storage tanks with environmentally-responsible double-wall construction.

All equipment is fully tested to ISO standards and safety measures are built-in to lessen environmental impact.

Battery storage system

We offer a ready-to-install battery storage system, comprised entirely inside a single standard 20 ft container. This mobile and modular solution includes batteries, inverter, HVAC, fire protection and auxiliary components, all tested and pre-assembled by Aggreko experts, and seamlessly operated by our smart software.

Our battery packs can be delivered and deployed almost anywhere. Single units can be easily combined to deliver the power and energy capacity required for your business. The system can cover a variety of applications

from 1 MW up to multi-MW power output and is available as power and energy version. And the best: we take full responsibility for your system design, installation, performance, maintenance and for the end of life of the batteries and their recycling.

Aggreko Solar Power

Lower costs of energy and zero emissions - our one megawatt (MW) Solar Power is the ideal solution for customers who want to benefit from clean energy innovation without the need for long-term investment. Our solution is optimised for areas with weak or no grid connection. It can help to overcome infrastructure constraints and reduce the need to transport fuel over long distances.

The SPP is also mobile, modular and can be deployed in as little as three months. Our solution has low O&M requirements and is perfectly suited for harsh environmental conditions. And the best part? Our specialised services include everything from initial assessments to on-site O&M.

We offer this solution for rent, with no costly up-front investment. Contract durations start at five years, which gives you full flexibility if your business operation or market conditions change.

Our full range of equipment comes with our own Aggreko Remote Monitoring (ARM), which keeps a close eye on all operations and sends real-time data to our team of experts in our Remote Operating Centre (ROC) who are on-hand round the clock to make sure the power we provide is working optimally so your mine can keep moving forward.



SOLAR POWER



BATTERY STORAGE



THERMAL GENERATION

We offer a technically and commercially fully integrated customer hybrid solution

One single hybrid contract

- **Single PPA captures all costs** including management of intermittent power
- **Turnkey solution**
- **No hidden costs**
- **Highly scalable power:**
- **From 5-10+ years:** shorter contract duration than offered by solar IPPs
- **Hybrid performance:** High performance guarantees in line with Aggreko brand quality promise

Case Study

CUSTOMER

Nevsun

LOCATION

Eritrea, Africa

Hybrid system cuts costs and emissions



THE CHALLENGE

Power a remote mine and lower power costs

Our customer needed to lower their power costs to profitably convert their gold mining operations in copper and zinc. They were happy with the reliability of our containerised, mobile and modular diesel plant but were looking for ways to reduce their fuel costs. Volatility of fuel prices can directly impact operational costs therefore lowering the reliance on diesel power also minimises risks.

They had been approached by 3rd party solar developers offering a lower cost of energy but they did not want to commit to a 20-year contract. They were also concerned about how solar intermittency could impact the reliability of the power station and who would ultimately be held responsible and accountable for their electricity supply. Having two different power suppliers did not seem ideal.



THE SOLUTION

One-stop for customer's power, thanks to our solar / thermal integration

We offered our customer an integrated solar-thermal hybrid solution to keep it simple and wrapped everything into a single contract, with added power guarantees for peace of mind. Our customer did not have to find CAPEX to invest in the solar plant: they buy solar energy per kWh. Our unique solar-diesel hybrid

solution delivers more than 12% savings on fuel - with around 10,000 litres being saved each and every day.

We provided our reliable solar and thermal power, integrated by our cutting-edge software, to ensure a reliable source with costs lowered from the very first day.

THE IMPACT

Cheaper, reliable power - with lower emissions

With no upfront costs required for the solar plant, our customer can conserve their capital for their mining operation, save on their energy costs by displacing diesel fuel with cheaper solar power and improve their environmental impact by cutting carbon emissions by 10,000 tonnes annually.

Case Study

CUSTOMER

Gold Fields Australia

LOCATION

Leverton, Western Australia

Gold mine to introduce renewable energy and battery storage to lower costs and environmental impact

THE CHALLENGE

Help our customer introduce renewables into their energy mix without compromising power reliability

Gold Fields Australia committed to reduce its carbon footprint and use renewables for at least 20% of total life-of-mine power requirements in new projects.

Two years previous, after a gas line extension was built by AngloGold Ashanti to service their mining operations in the region, Gold Fields Australia were able to use gas, a cleaner cheaper fuel source than

the diesel it was using at the time to power their operations going forward.

That's when they turned to Aggreko to deliver a 22 MW gas power station. Working closely with them to understand their needs, we delivered highly efficient bespoke modified engines that reduced their fuel costs and environmental impact.

Knowing Aggreko had recently announced the launch of microgrids-as-a-service for customers who want to leverage the benefits of a hybrid energy solution while minimising capital outlay, discussions began about how and if this could be incorporated into their current power package without compromising the micro-grid stability or reliability.

KEY FACTS

27 MW

Gas power

7.7 MWp

Solar power

2MW/1MWh

Battery storage



THE SOLUTION

Leverage the benefits of hybrid energy and minimise capital outlay

To integrate 7.7 MWp of solar power generation, and 2MW / 1 MWh battery storage with the existing gas supply as a hybrid power station – under one contract and with no capital outlay.

This unique energy package combines solar, thermal and battery

storage that's seamlessly integrated and managed by our powerful software platform - guaranteeing full system availability and optimising their existing thermal assets life.

This new solar gas hybrid power station will meet the increased daily power needs of the entire mine of

24.2 MW, with 8 MW allocated to the Wallaby underground mine and the remaining 16.2 MW for the processing plant, associated facilities and the mine accommodation camp.

THE IMPACT

Lower energy costs and minimised environmental impact

Power generation is a significant proportion of operating costs of the Granny Smith mine for Gold Fields.

Using the latest hybrid energy technologies will enable them to significantly lower their total cost of energy and reduce their carbon footprint, while demonstrating their ongoing commitment to both environmental sustainability and innovation at its operations. All of this without compromising the reliability of power supply and productivity of the mine.





Power **how** you need it,
when you need it, **where** you need it.

