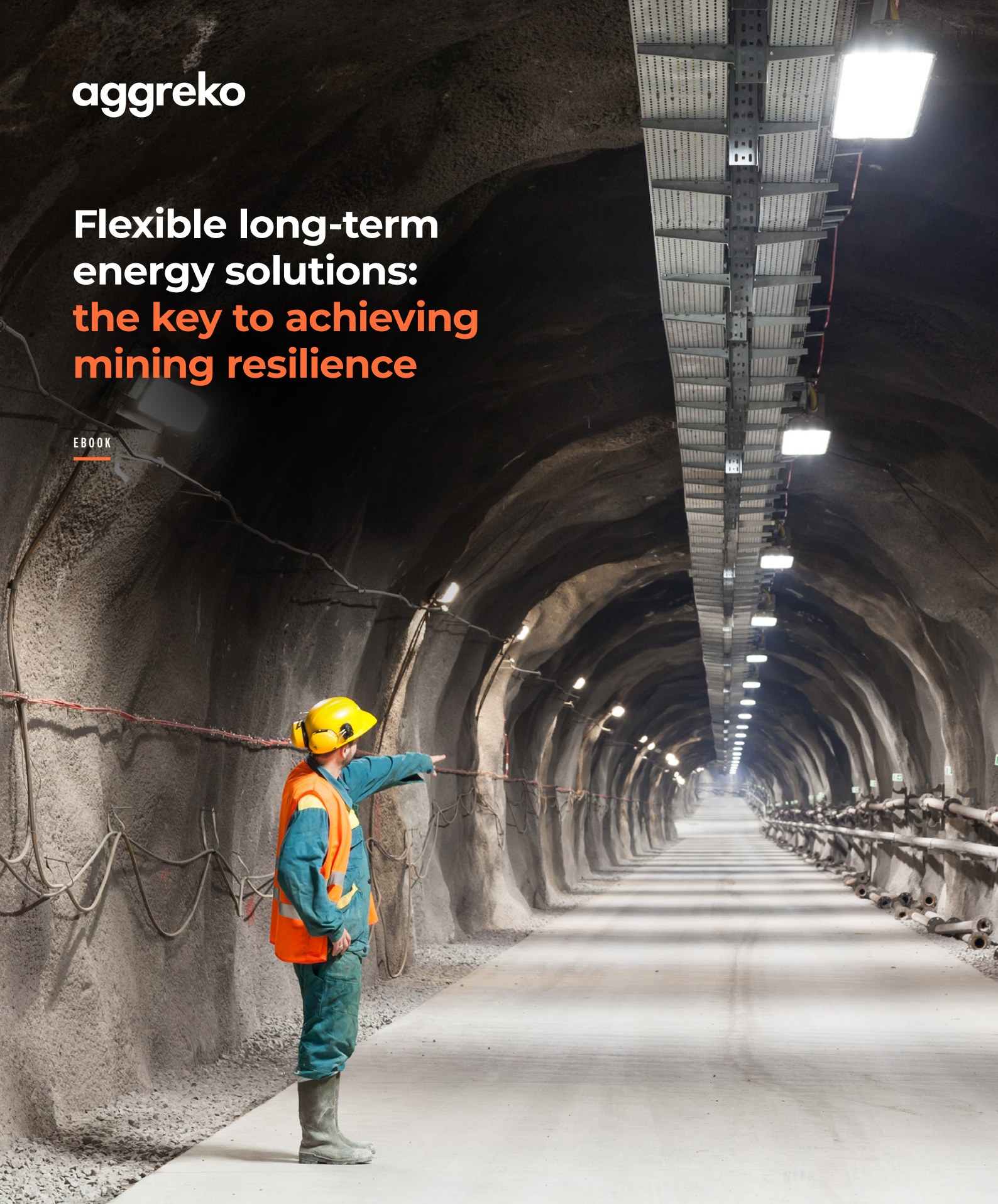


aggreko

**Flexible long-term
energy solutions:
the key to achieving
mining resilience**

EBOOK



What you need to know about long-term energy for your mining projects

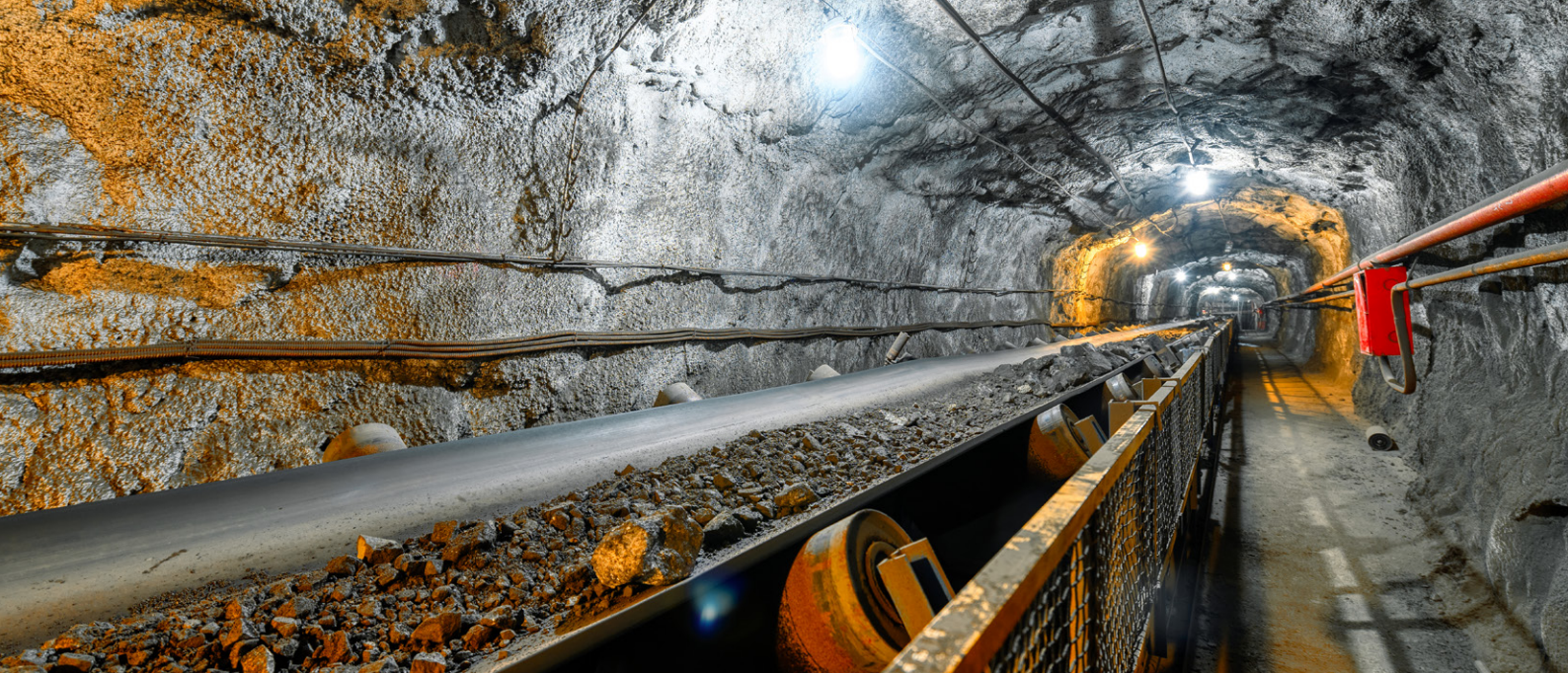


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Mining is an industry constantly in flux – with new technology, new regulations, and new targets around every corner.

Today, mines are under more pressure than ever before to navigate these complex hurdles in order to grow, be compliant, and ensure financial stability.

But in order to do all of these things and gain the resilience they need to thrive in the future, mining organisations need to re-imagine and reinvent both their architecture and business practices – from the ground up.

“Miners can no longer depend on yesterday’s portfolios and practices to create value in this newly dynamic and fiercely competitive landscape.”

– Mine 2023: The Era of Reinvention, PwC.



For instance, one of the most pressing priorities for the sector is the need for a more sustainable energy architecture.

Sustainable energy architecture would allow companies to reduce their reliance on grid-based power so they can achieve their sustainability goals. [PwC’s Mine 2023 report](#) highlighted the importance of this shift, stating that mining companies should all strive to join the ‘global transition to clean energy’.

The mining sector has already put significant renewable and alternative energy solutions in place. However, achieving the right balance of power across multiple operations and locations still remains complex.

Over the past few decades, mining companies have invested in energy architecture designed to mitigate their reliance on grid-based power.

This has helped them embed greener energy principles throughout their business practices, while also making inroads into the [United Nations Sustainable Development Goals \(SDGs\)](#) – specifically Goal 7: to ensure access to affordable, reliable, sustainable and modern energy for all.

Aligning organisations with the SDGs, global carbon emissions, and sustainable energy expectations is both a priority and a challenge for the mining sector. The commitment to alternative power and achieving net zero is challenged by costs, grid instability, and high-power demands.

And there’s plenty more that needs to be done. Today, mining processes still contribute [up to 7% of global greenhouse gas emissions](#).

To succeed, companies need to build a stable power infrastructure – this will buffer it against ongoing grid instability, while also balancing the cost of alternative energy with the cost of doing business.

On the one hand, mines can benefit from sustainability-linked financing, which can allow them to build green and operate within rigorous environmental, social, and governance (ESG) expectations.

On the other hand, the sector is still battling the cost challenges introduced by the pandemic, economic volatility, and geopolitical instability.

One thing is clear – moving to sustainable and hybrid energy solutions can transform the industry by significantly reducing the energy cost to a mining company.

Considering that energy is one of the sector's biggest expenses, this move is of inordinate value.

Research by [Deloitte](#) found that the cost of energy is around 30% of the total cash operating costs.

Effective energy management and mine design can reduce this cost by up to 20% – a saving that translates across the bottom line, ESG goals, carbon footprint, sustainability metrics, and investment profile.

A transformational saving for the entire mining industry.



Both energy and cost conversations come hand-in-hand within the mining sector: balancing gains from a hybrid, customised, and capable energy platform with expenditure.

EY's analysis of 2023's top 10 business risks and opportunities for mining and metals found that costs are likely to remain high, which means that mines need to find innovative approaches to their energy investments. This includes renewable energy, innovative approaches that focus on delivery and cost-cutting, and joint ventures that allow for economies of scale.

This also ties in with the International Council of Mining and Minerals' action plan, requiring members to focus on achieving net zero Scope 1 and 2 greenhouse gas emissions by 2050.

So, mines need to unpack what their priorities are and focus on what would ensure their energy commitment remains sustainable and relevant. This understanding includes:

- **Understanding the ESG guidelines**

These should apply to your mining sector and organisation, and align with your customer, investor, and stakeholder expectations.

- **Available fuel sources and solutions**

Alongside your unique fuel requirements, you can create a realistic picture of your energy expectations versus investment.

- **Recognising the mining power requirements across various operations and multiple locations**

The fact that more mines are being situated in off-grid locations with shorter lifecycles means permanent power structures are no longer financially viable. Instead, mines need to consider scalable microgrids that can give them the energy they need with maximum flexibility.



With these needs clearly defined, mines can then develop more strategic approaches to their energy demands that allow them to achieve their ESG and energy goals.

Thanks to an evolving energy provision market and innovation in energy solutions, it has become increasingly easy for mines to find the right energy mix structured around their business.

For instance, some mines may benefit from a highly efficient energy solution that allows them to switch to a lower-emission thermal fuel. Or, they could hybridise their energy mix with renewable energy solutions that have the capacity to deliver over both the long and the short term.

It's also important to consider the speed at which mines need to move from legacy energy provision sources to new alternatives.

If power is required quickly, then bridging power options are available in the market, designed to help mines remain stable and capable within their energy portfolio. These also model power demands based on load profiles and build a solution that aligns with long-term expectations.

Ultimately, many of the challenges the mining industry faces today can be addressed simply by adapting the ways in which mines are powered, introducing flexible solutions designed to reduce costs and emissions while ensuring reliability and availability.

For instance, breaking down a mine's energy transition into phases can simplify a comprehensive energy reimagination or approach. It also removes the risk of doing too much too soon, while saving costs and lowering emissions through a measurable reduction in diesel usage.

In addition, mines can also adopt alternative fuels, including renewable energy, to make savings without impacting production and gaining ground towards net zero.

A flexible approach also allows mining companies to leverage innovation at low risk, without the concern of always having the latest technology or products.



One of the most vital factors to get right within the mining sector is finance.

There are multiple financing options available to mining companies, allowing them to better manage their finances without compromising on growth, energy investment, or strategy.

The cost of financing a new mine is high – the risks equally so. Project timelines are extensive. Prices are often volatile. ESG considerations impact investment decision-making, further impacted by the current economic downturn. And geopolitical conditions require skilful navigation on multiple levels.

For instance, the Carbon Border Adjustment Mechanism (CBAM) – introduced by the European Union – is the tariff charged on carbon-intensive items that include iron, steel and aluminium.

This level of legislation is only likely to increase and expand into other countries and jurisdictions, fundamentally affecting costs within the mining sector.

Here are just some of the current financing options open to mining companies.

Venture capital investments

These investments are becoming increasingly relevant for major mining companies, as they help to accelerate innovation and investment into technologies designed to drive growth and exploration.

However, this level of financial support tends to be earmarked for more established organisations, which can be limiting for newer mines or projects.

Mergers and acquisitions (M&A) transactions

Investors are seeking out smaller companies that will allow them to rapidly gain returns. According to White & Case, this is a growing trend in Africa as investors pay attention to startups and smaller projects.

The downside is that these are more targeted at smaller companies, which can leave incumbents or other firms out of the running.

Traditional equity

This is the standard route for financial support by many mining companies, but it is being rapidly supplanted by alternative forms of finance that include royalties and pre-pay financing.

Debt financing

Utilising debt financing allows mining companies to access the necessary funds for mining operations, while leveraging the expected future cash flows generated from mining activities to repay their debt obligations over time.

It allows mining companies to manage their capital structure and balance their funding needs between equity and debt, taking advantage of available financial markets to support their growth and expansion plans.

Green financing

In recent years, there has been a shift towards financing solutions built on ESG principles that allow companies to access different credit facilities based on their sustainability capabilities.

The Egyptian gold mine, Centamin, recently gained financial traction within a \$150 million sustainability revolving credit facility which was built on sustainability commitments.

In addition, the energy transition brings financial wins of its own, opening up new sources of capital in the form of sustainability-related bonds with green bonds growing to \$450 billion in 2022 with an anticipated 30% increase in 2023.

One thing is for certain – the mining sector is volatile.

Mines are crucial to the global energy transition, as they provide 'the commodities for renewable energy and climate technologies'.

On the downside, investors are divesting their fossil fuel assets. As a result, mines are finding it challenging to find funding from traditional sources, and there is increased price volatility over the near- to medium-term.

This highlights just how much business operations are affected by economic, political, and social fluctuations, all of which require agility in energy provision and investment.

Mines need to embark on decarbonisation plans while refining their energy portfolios and remaining ahead of the market.

So it's essential for mining companies to understand the risk profiles and flexibility it requires to move into their new energy portfolio.

For instance, mining companies don't want to be locked into long-term solutions if an operation has to be terminated early – whether it's due to a price crash or economic complexity.

These risks need to be weighed up long before investing in a solution, alongside project and finance flexibility.

In volatile commodities markets, the mining industry must manage its operations in a flexible way – from changing the size of operations to altering the mine's lifespan.

As a result, mines need energy solutions that are designed as flexibly as possible, while still being adaptable to energy usage. This means that they can still be charged based on consumption, but can also provide the security of guaranteed minimum offtake.

So with this added flexibility, mining companies also need on-demand power generation assets, ready to easily adapt to changing global environments and decrease power options.

All within a moment's notice.

What's clear is that these solutions need to be developed in collaboration with energy providers to mitigate the risks of poor energy provision, grid collapse, and excessive costs.

The hybrid energy landscape has emerged from the challenges faced not just by mining, but by organisations across multiple different sectors.

In fact, 35% of CEOs believe their companies will be highly or severely exposed to climate risks over the next five years.

However, hybrid requires a focused and balanced approach to ensure it can overcome what is known as the 'energy trilemma'.

This trilemma is the need to balance **sustainability**, **cost**, and **reliability** for mining operations, across multiple locations and within varied environments.

It's critical to find a balance across the different hybrid technologies to mitigate the risks while achieving this balance over the long term.

It's even more imperative under the immense pressure to meet ESGs and sustainability targets, felt across investments, supply chains, and exports.

So, hybrid models offer mines one very important thing – **customisation**.

They allow mines to use multiple energy sources, providing operations with superior, safe, and stable energy, especially in areas where there is limited to no access to mains power or gas.

Hybrid power plants combine the advantages of renewable energy such as wind, hydropower, solar, and battery storage with the reliability of thermal generators. Thanks to their ubiquity and customisation capabilities, hybrid power solutions offer mines the key to finding balance across their three key power supply priorities:

1. Decarbonisation – mines require solutions that have the highest level of decarbonisation potential, helping to support their ESG mandates and sustainability compliance expectations.

2. Security of supply – a secure power supply needs to be set up so that a mine's equipment and machinery can be powered effectively. A stable supply is configured in a way that ensures the quality of power and prevents unplanned outages.

3. Low cost of electricity – this solution needs to provide the lowest levelized cost of electricity (LCOE) over the proposed contract duration and is based on the predicted energy yields of renewable sources.

Achieving this balance is critical for cost optimisation, energy efficiency, and sustainability – as maximising one priority can lead to deficits across the other two.

For example, a high level of renewable energy can be significantly more capital-intensive, which then introduces financial risk, potentially creating further challenges around reliability and sustainability.

Mines must decide their top priority among the three and use it as the basis for determining how much they can compromise on the other two goals. This ensures that the hybrid power solution meets their expectations and stays within the limits required by regulations and their specific needs.

Providing dependable energy to mining operations involves keeping the power supply highly reliable. This helps reduce the risk of disruptions to business and mining income.





With Aggreko's proven expertise, you can optimise your hybrid power solutions and reduce carbon emissions, advancing your business with cleaner energy solutions throughout your project's lifespan. We understand your energy needs and the challenges of lowering emissions in the mining sector.

We collaborate with you, using our expertise to create the right solutions and services tailored to your energy requirements, site size, environment, and compliance standards.

Our modular, scalable equipment helps you to harness innovation with minimal risk, allowing you to focus on your core business, while also giving you the flexibility to scale up or down depending on your demand.

This security of supply means you have as much power as you need, when you need it, alleviating the risk of outages.

In addition, our flexible contract models allow you to embrace renewable energy sources, and also eliminate the need for capital expenditure, relying solely on operational expenses (OPEX).

This approach addresses the need for decarbonisation while also ensuring competitive energy costs.

At Aggreko, our primary focus is on a sustainable future, helping you achieve your net zero potential. We support our solutions with 24/7 remote monitoring, and with our global team of engineers, we're ready to tackle unique challenges no matter where you are.



Our hybrid solutions are an effective way to overcome the energy trilemma – balancing sustainability, costs, and reliability for power generation during any mining project.

Boosting efficiency and profitability by making renewable energy practical, Aggreko's hybrid power plant reduces both fuel expenses and emissions to support ESG goals.

As well as the low energy, fuel, and O&M costs, hybrid power plants also offer flexible service life to make renewable power more viable to mining companies.

These plants combine renewable sources like wind, hydropower, and solar with battery storage and reliable thermal generators. Our battery system ensures consistent power quality, offering an energy solution you can rely on.



Aggreko success story

Aggreko addressed the challenge of providing safe, reliable power to a remote Gold Fields open-pit mine in Chile, located at an altitude of 4,500m in the Andes and disconnected from local power grids.

We developed a tailor-made hybrid power system, including a significant 9.9MW solar PV installation, resulting in an impressive \$1.1 million savings in cost, and offsetting 10.5 tonnes of carbon emissions over the project's lifetime.

This hybrid solution enables the mine to operate off-grid sustainably – highlighting our commitment to delivering reliable power in extreme conditions – and strengthening our partnership with Gold Fields over a 10-year contract.

AGGREKO VIRTUAL GAS POWER PLANT

Our virtual gas power plant is an eco-friendly and economical choice compared to diesel and heavy fuel oil (HFO). It delivers gas to your location, regardless of where you are, using a virtual pipeline.

This solution is ideal for sites without a physical gas pipeline, allowing them to switch from diesel to gas, and for companies with a gas pipeline connection looking to enhance their capacity.

AGGREKO GENERATORS

Our generators are housed in ISO-standard containers for easy transport, with the ability to run on gas, diesel, biofuel, or hybrid sources.

They are customizable to meet your requirements, operate quietly at 50 or 60Hz, and we currently have the world's largest fleet of mobile power generation modules, totalling around 10 GW.



AGGREKO SOLAR POWER SOLUTIONS

Our solar power solutions are versatile and ideal for areas with limited grid access, ready for deployment in just three months. They enhance power reliability, reduce long-distance fuel transport, and seamlessly integrate with thermal and battery storage for an extra resilient power system.

Our flexible contracts, starting at just five years and without any upfront investment, empower businesses to harness clean energy without long-term commitments, allowing them to adapt to a rapidly changing energy landscape.

We provide various options, including fixed, self-contained, and quickly deployable units tailored to specific site and regional requirements.

Aggreko assesses customers' needs through remote and site visits to determine the best solar solutions. These can range from floating arrays on water bodies like dams and lakes to tracking systems, fixed installations, or mobile units.

Partnering with multiple PV manufacturers ensures customised solutions that optimise solar resource potential, delivering maximum fuel savings and carbon emissions reductions.

By seamlessly integrating with our thermal and battery storage products and controlled by Aggreko's Control Platform, our solar solutions create more resilient, efficient systems with lower carbon footprints.

Aggreko has been working with the wind farm industry since it first began.

So we know each stage of the design and construction phase brings unique challenges.

We can work with turbine manufacturers, wind farm operators, and contractors to help you deliver complex wind turbine commissioning solutions, making us your ideal partner throughout your wind farm lifecycle.

Across all of Aggreko's offerings, technology, and services, we tailor our solutions to fit your unique and remote needs.

For instance, to help you gain further independence in the world of renewable energy, we can install solar and batteries at your site, so you can expect a carbon emission reduction of up to 30% over 12-18 months.

Our batteries can run diesel or gas engines at a higher loading with greater efficiency and reduced fuel consumption, capturing energy within the batteries for later use.

Aggreko's modular, mobile systems mean that you don't need to install a proposed solution all at once. In fact, we embrace a phased approach to provide you with the support you need to evolve your energy profile in line with your business expectations.

Our fleet model of operation makes it possible for various technologies – such as solar and batteries – to be removable so you can swap out technologies throughout the contract term. This helps you to maximise different priorities in line with your business strategy.

Ultimately, this phased approach is equally balanced in the Aggreko flexible contracting methodology, allowing mines to install and finance their projects over time.



More than just a power provider, Aggreko is a partner.

We aim to reduce costs and boost performance in your energy usage. Through our flexible contracts, we'll handle everything – from capital investment to facility operation and maintenance – so you can concentrate on the day-to-day operations of your business.

To keep you one step ahead, we also keep up with technology upgrades to give you the latest and greatest our company has to offer.

And to handle flexibility for your mining projects, we offer early termination options to minimise financial and operational risks for longer-term projects.





The hybrid remote energy supply experience

From building, operating, and managing multiple operational remote hybrid power solutions within the mining sector globally, we know how to meet the requirements of miners..

So far, we have designed and installed three of these global projects, operating them for several years. This has allowed mining companies to reap the benefits of lessons learned from implementing new energy technologies, by relying on a trusted solution from day one.

Experienced EPCM

We offer comprehensive engineering, procurement, and construction management (EPCM) services, ensuring accountability for delivering reliable power within defined performance criteria.

We understand that managing costs and power reliability is crucial for your mining operations. That's why we provide you with the lowest cost, highest performing power options, backed by strong global supplier relationships and reliability guarantees.

Our hybrid solution offers dependable energy to boost your productivity while simultaneously reducing your costs and carbon footprint. It's a fast, convenient solution, all bundled into a single contract tailored to your needs.

Mining expertise

We have been providing power to mine sites around the world for more than 30 years. This brings us expertise in the challenges and requirements of mining in complex conditions, as well as the very specific needs of our customers.

Our network of depots can respond quickly to deliver resilient and relevant support and solutions, whenever you need them.

Global footprint

Thanks to our internal company network, we can provide access to a pool of global technical experts.

You, like many of our past customers, will have the opportunity to gain valuable expert advice and solutions that meet your unique efficiency, environmental compliance, and cost requirements.

Local presence

We have a local presence across numerous regions in Europe, Asian, the Middle East and Africa.

This enables us to provide you with power station operations, maintenance, and support that offer reliable and efficient installation and operations.

You can rely on Aggreko to provide you with flexible energy solutions that seamlessly power your mining operations.

We understand that energy is the backbone of your mining activities, so our goal is to equip you with the right resources for success.

For example, we offer tailored energy solutions to meet your specific needs, allowing you to adapt to changing power demands, location challenges, and environmental considerations.

Our commitment to flexibility ensures that you can switch technologies and fuel types, or even terminate contracts early without the risk of being locked in.

When time is of the essence, Aggreko's bridging power solutions can get your operations running within weeks. We collaborate closely with you to model your power demand based on load profiles, ensuring your energy requirements are met rapidly and efficiently.

You also have the freedom to choose from a range of payment options, including upfront investment or operational expenditure.

Our IPP-style arrangements offer payment based on availability and energy usage, providing financial flexibility to align with your business strategy.

Aggreko's Build-Own-Operate-Maintain (BOOM) contract helps you preserve capital while still benefitting from cost-effective energy solutions.

We take care of maintenance, upgrades, and technology integration, ensuring your operations run smoothly throughout the entire mining life cycle.

This means that mining companies can not only avoid CAPEX in favour of OPEX – they also have the freedom to move away from set-in-stone venture capital investments and M&As.

At Aggreko, we understand just how variable project timelines, fuel prices, the global economic landscape, and geopolitical conditions can be. That's why we provide you with a more flexible way to fund your next mining project, in line with how you want to do it.



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Discover how Aggreko can help you, and how we have already transformed the energy risks and profiles of other organisations just like yours.



Success story:

"Cost effective hybrid power that lowered gold production costs: Resolute Mining, Mali



Success story:

Solar Hybrid power cuts costs and emissions: Bisha Mines, Eritrea



Success story:

One of World's largest renewable microgrids powers remote gold mine: Goldfields, Australia

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