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AFRICAN GENERATOR SET MARKET REPORT

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While the African continent is rife with initiatives and national policies to stimulate electrification rates, an energy barrier remains in place for the majority of the population and many businesses, making it increasingly challenging to compete on the international stage. As a result of this, while environmental concerns escalate and the focus on renewables intensifies, the use of diesel generators has been steadily growing. The stability of this trend is suggesting a strong future for this piece of equipment – which has served the continent faithfully for many years – and which manufacturers are seeking to cement through the implementation of new, innovative technology.

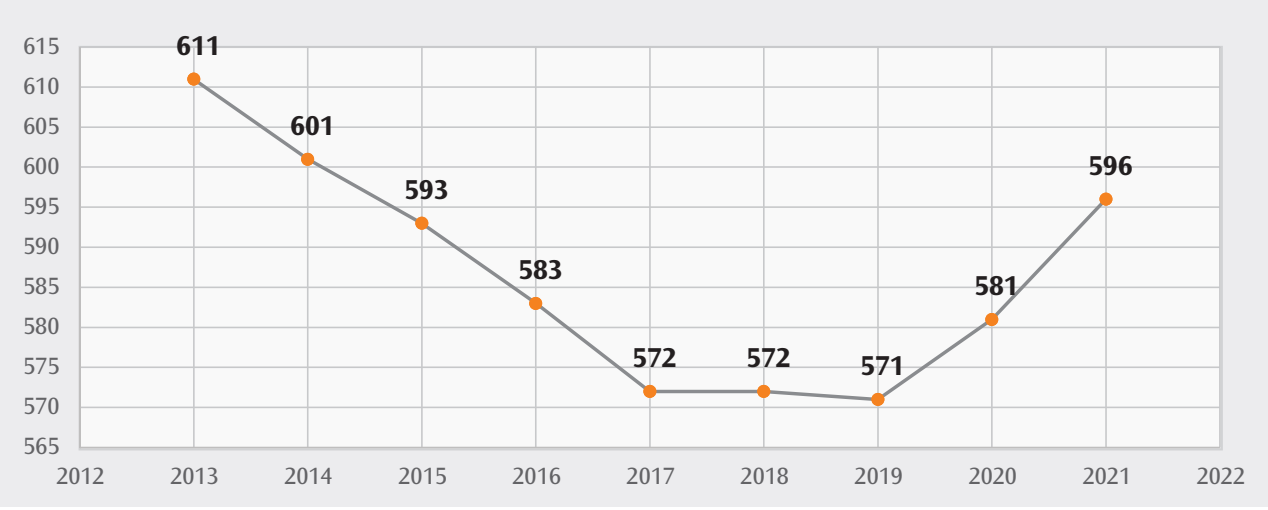
THE ENERGY DILEMMA

Since the turn of the millennium, according to data from the World Bank, sub-Saharan Africa had recorded a steady increase in electrification rates which rose from 25.6% in 2000 to a high of 47% in 2019. Before the pandemic, according to the IEA, the number of people each year gaining access to electricity almost tripled from 8 million between 2000 and 2013 to 24 million between 2014 and 2019 – a rate which exceeded population growth and therefore resulted in the proportion of those with access to electricity increasing.

As a result of efforts to reduce the number of people without electricity and owing in large to the dynamism from a few countries such as Kenya, Senegal and Rwanda, the approximately 611 million who lived without adequate access to power was reduced to around 571 million in 2019. In keeping here, the continent's total installed energy capacity increased to 260GW providing people and businesses a greater sense of security around their energy needs.

While this was certainly heading in the right direction, it should of course be remembered that Africa remained the continent most afflicted by energy poverty, and this trend was only made worse by the onset of the pandemic. As Covid-19 disrupted global business, brought extra caution around investment decisions and largely delayed projects coming online, progress stalled. With more than 20 African countries pushed into debt stress, progress around expanding access to electricity has stalled and these difficulties have only been heightened by the outbreak of war in Eastern Europe which has hurt consumers and businesses around the world – most acutely in the developing world. Since the outbreak of coronavirus on the global stage in 2020, the number of people without access

People without access to electricity in sub-Saharan Africa 2013-2021



Data source: IEA

has increased for the first time since 2013 and SSA's share of the global population without access to electricity rose to 77%.

Fundamentally, a lack of reliable access to energy is an impediment to business, and nowhere is this being demonstrated more clearly than the problems currently facing one of sub-Saharan Africa's most developed countries – South Africa. The origins of the energy crisis which is currently holding the country in a vice are varied and the finger pointing over perpetrators is fierce. While Covid-19 has no doubt propounded issues, for most it was sustained mismanagement and lack of development which has been the primary cause. While there is now an abundance of literature examining the decline and plotting ways to remedy the situation, the environment has deteriorated to the point that, across 2022, the country experienced as many as 200 days of loadshedding throughout the year – which has, understandably come as a profound shock to a population of which 84.4% are considered to have access to electricity according to World Bank data.

The Government has responded with numerous initiatives to remedy the situation such as the National Energy Action Plan to improve the performance of existing power stations and add new generation capacity to the grid as quickly as possible. However, moving into 2023 the country made headlines for all the wrong reasons once again when Eskom recorded loadshedding at a record 7,000MW within February and, in the same month, President Cyril Ramaphosa officially declared a national state of disaster in regards to the energy crisis as it posed "an existential threat to our economy and social fabric."

This crisis certainly is proving a profound threat to many of the country's businesses and key industries. The most obvious example in recent months has been mining, where it was highlighted at the recently-concluded Investing in African Mining Indaba. Here, Minister of Resources and Energy, Gwede Mantashe, surmised that the power supply disruptions in 2022 led to a decline in mineral production across all commodities, with November marking the 10th consecutive contraction in volumes produced. Data published by national service Statistics South Africa found that in December 2022 mining production decreased by 3.5% year-on-year, with the largest negative contributors manifesting in iron ore, diamonds and PGMs. This contributed to a total mining production contraction of 7.2% in 2022 compared with 2021.

South Africa's central bank has now estimated that the current rate of loadshedding is costing the country US$51mn a day and, according to its estimates, could shave off 2% from the countries expected economic growth in 2023. This dramatic situation is affecting organisations across the full spectrum of the country's industries, from the largest mining companies down to small businesses on the shopfront. According to Stella Ndabeni-Abrahams, Minister of the Department of Small Business Development, the crisis is having a devastating impact on small businesses with SMMEs particularly hit hard by continued power outages. In a media statement, the Department added that its Small Enterprise Finance Agency (sefa) conducted a research study on the impact of loadshedding on its funded clients and found that most respondents are highly reliant on electricity for their operations; 71% of respondents indicated that they are negatively impacted by loadshedding; and that the majority of respondents will require an alternative power source to continue with their operations.

The case of South Africa's energy problems is dominating the headlines because of the country's status as a developed nation, but these are issues which are plaguing countries across SSA. Inhabitants of Nigeria are familiar with widespread blackouts with the national grid collapsing more than 200 times in the nine years prior to 2022, with the country experiencing multiple collapses across last year. Although making progress, the fragility of Zambia's energy network was exposed at the start of 2023 when the Kariba North Bank Power Station experienced a drastic reduction in available water for electricity generation, causing the facilities output to plummet. Compounded by the planned outage of a 150MW generator at Maamba Collieries Limited Power Plant (routine maintenance), ZESCO was forced to ramp up loadshedding to 12 hours a day while it sought to optimise electricity power generation at other stations. In Kenya, near the end of 2022 the national grid received the first dispatch of hydropower imported from neighbouring Ethiopia. The deal was organised in order to offer lower retail prices to consumers and was prompted by a spike in demand in July which saw the buffer capacity drop dangerously low. The issues being faced by each countries' national grid (which vary in severity) combined with the stark lack of electrification for much of the population, highlights the challenge for the continent's inhabitants in securing reliable electricity for personal use and business purposes.

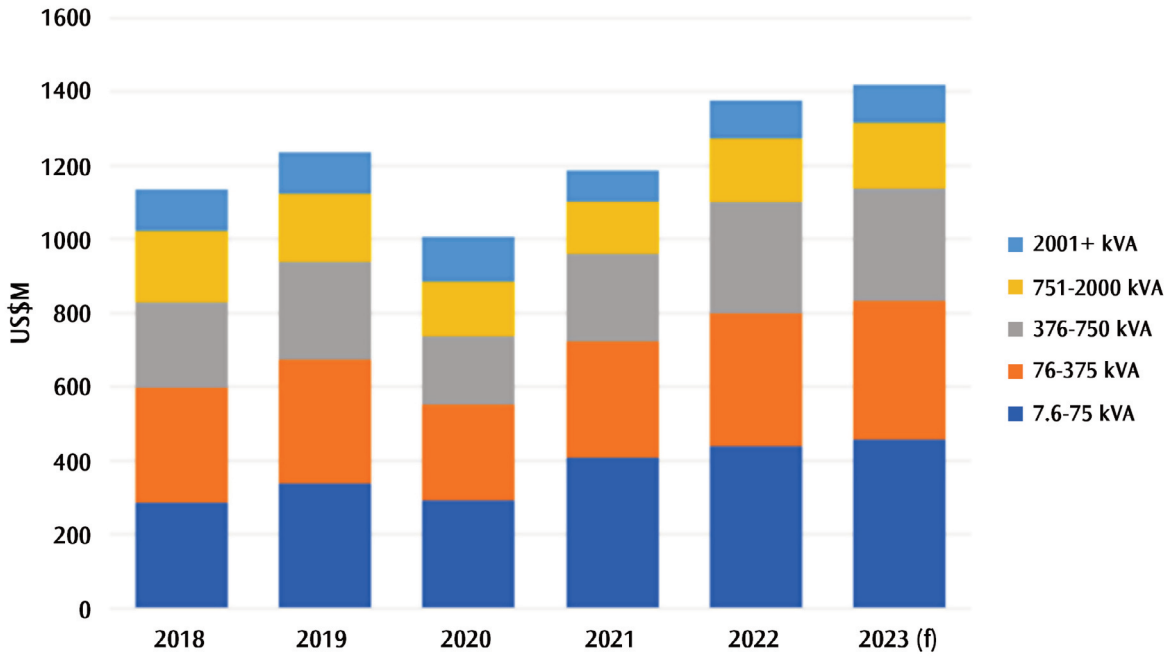
PICKING UP THE SLACK

As outlined by the South African Minister of Small Business Development, many companies and households are forced therefore to turn to alternative power sources, and this holds true for larger companies as well – many in South Africa now the shackles around embedded generation licencing have been released, are developing their own projects to meet their energy needs. While this is giving rise to a promising future for a range of solutions – especially those which incorporate renewables that draw from the abundant natural resources the continent is blessed with – for many, diesel generators, which have served as an integral part of Africa's energy mix for decades, have provided the most familiar fix.

This trend has become apparent in the spending of the retail sector, with key groups recording heightened expenditure on their generators in the last few years. South African retail business Pick N Pay, for instance, reported that the group spent an additional R346mn (approximately US$19mn) year-on-year on diesel to run generators at stores for the first 10 months of 2022 and, as of the start of February, is currently on a run rate of approximately R60mn (approximately US$3mn) per month. It also noted that it is experiencing increased generator repairs and maintenance costs as it continues to fall back on this form of backup power in the face of the national electricity crisis. Shoprite Holdings, a pan-African retailer, recorded spending on diesel for its generators at R560mn (approximately US$30mn) during the six month period to 1 January and Woolworths has reduced its operating profit estimate due to the financial impact of loadshedding – in the same statement it made note that it had previously made significant past investments in its energy supply capabilities with 99% of stores and distribution centres equipped with generator capacity.

At one stage, the rise of renewables, low commodity prices and lower investments posed significant threats to the market, with African imports of diesel generating sets decreasing by 16% in 2017. However, even at this stage, the outlook for the next few years was promising owing to an expected uptick in major industries such as construction and mining. Several years on and one pandemic later, amid patchy grid-based power and often-erratic renewable solutions, the market is thriving. While the pandemic caused wide-spread chaos across the market, as it did for most, by the first quarter of

AFRICAN MARKET FOR DIESEL GENERATORS



Source: www.powergen-pages.com

2022 imports of diesel generators had increased by 12% year-on-year and were only 3% lower than the pre-crisis level, reflecting a sustained pick up since the outbreak of Covid-19. At this time, most countries and industry sectors – such as construction, manufacturing, mining and telecommunications – witnessed an increase in demand due to the general market recovery and rising need for electricity.

This pattern of growth has extended throughout 2022, with the latest statistics from PowerGen Pages indicating a continent-wide diesel genset market growth of 16% across 2022 – which is contributing to a post-Covid growth that began in 2021 (18%). This growth has benefited most regions of Africa, particularly the oil and gas economies as well as mining exporting countries, and the African market should continue to grow in 2023 thanks to strong demand in electricity, but in a more moderate way (3%). Market growth is now hampered by longer lead times, and also uncertainty weighing on the economy, particularly in the second half of 2023.

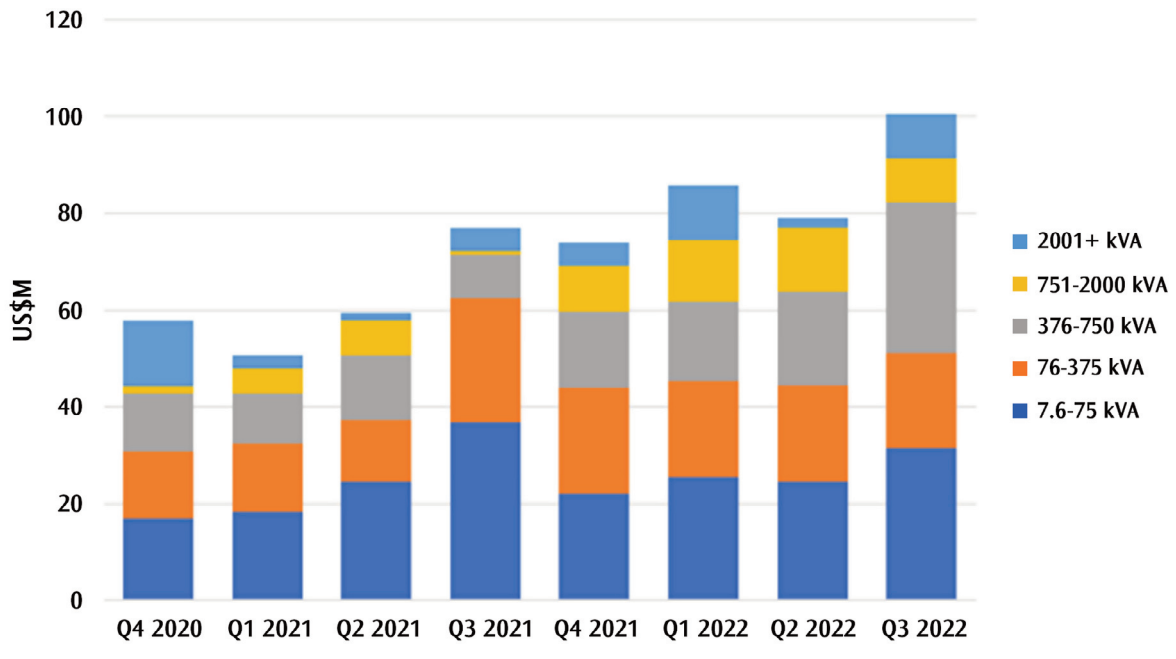
Breaking this down further, generators >500kVA experienced particularly strong growth at +25%, although this must be taken in the context of <500kVA generators having very strong increase in 2021 at +31% and continued growth throughout 2022.

For >2000 kVA generators, growth has particularly come from South Africa and Nigeria which has seen sales more than double. This has been particularly encouraged by the manufacturing, mining, oil & gas segments as well as data centres with more large facilities coming online, particularly in South Africa.

Imports from China continued their strong growth in 2022 (40%), following a year in 2021 when they had already increased by more than 30%. This growth is achieved in particular in the power units (375-2000 kVA), thanks to the exports of international brands with production units in China. The current relative weakness of the Chinese domestic market is boosting exports, and the ongoing drop in maritime transport prices should support this growth.

While Nigeria still remains by far the most important market in Africa, the strongest growth has come from South Africa with more than 50% in 2022, due to the very severe disruptions to its grid in 2022 and thanks to the data centre segment which makes it the main African market today. On the other hand, the Algerian market is still not experiencing growth, and the recent regulations requiring generators to be assembled locally should slow down a return to strong growth.

CHINESE EXPORTS OF DIESEL GENERATORS TO AFRICA



Source: www.powergen-pages.com

SERVING THE MARKET

Maintaining this blossoming market is of course the variety of genset manufacturers and distributors, on hand to provide reliable power wherever it is needed. Among the ranks of those serving customers across the continent include the likes of Perkins, Aksa, Aggreko, Baudouin, Cummins, Volvo Penta, Zest Weg, Teksan Generator, Cantoni Motors, Caterpillar, Kohler Power Systems, Doosan Portable Power, AJ Power, and many more.

Quietly, these companies form the backbone of the market and ensure that the required equipment is arriving on location, wherever it is needed across the continent. However, often it is the larger projects which come under greater media attention and over the last year there has been a notable increase in line with sustained market growth.

Himoinsa Southern Africa, for instance, provided in rapid timelines a competitive, flexible, turnkey power solution to support a project being progressed by Renergen's wholly-owned subsidiary Tetra4 in South Africa on the assumption that Eskom would not be able to provide the required dedicated power supply required to supply the site for a minimum of eight months. The Himoinsa team installed and commissioned a fully-functioning power plant within three weeks of the site being ready as part of a solution which included eight, fully-synchronised generator sets. Himoinsa noted that its generators with Yanmar and MTU Engines have a high fuel efficiency rating which allowed Renergen to reduce costs at the early stage of operations. The plant ran efficiently on a fully turnkey solution, including the necessary manpower and operational planning requirements for the contract term, and beyond, until the utility connection was successfully installed, and the temporary power plant decommissioned.

In another example, in Senegal, technology group Wärtsilä is allowing the Sabodala-Massawa Gold Mine complex to maintain and expand its production schedules by extending the power generating facility and upgrading the electrical and automation system of the existing power plant. In this example, the company is installing three new engines which were 20% more efficient than the mine's existing assets which will help supply a 18MW extension, this allowing the operator to continue with its planned mine expansion.

Aside from more frequent visits to the front of media outlets, the growth of this market is contributing to swollen profits for associated companies. For instance, Himoinsa in publishing its 2022 results has recorded a significant increase in turnover compared to 2021 with a turnover of more than EU€350mn (approximately US$370mn) – of which Africa represented 12% of distribution. The company added that it expected further expansion in 2023 with sales predicted to top EU€400mn (approximately US$424mn) an estimation which is encouraged by the opening of a new production centre for the manufacture of generator sets up to 3,500 kVa which is due to open later this year. Recognising the prospects of the African region, the company has also opened a new logistics hub in Togo to market products to the member countries of the Economic Community of West African States (ECOWAS).

Rolls-Royce Power Systems business unit has similarly recorded a remarkable year having closed the financial period with strong growth and with order intake and underlying revenue at record levels. Here, the company saw strong demand in many end markets but singled out power generation including critical backup power and for engine systems and services. Similarly, as part of Volvo Group's wider full year 2022 report, Volvo Penta reported strong demand in all segments with that of power generation engines on a very high level globally – driven by the constrained energy situation. As a result, net sales increased by 33% in Q4.

SHIFTING THE FOCUS

While enjoying this time in the sun, those involved in the diesel genset network are aware that, without adapting to evolving dynamic consumer demands and market trends, it will not be long before they are cast into the shade. While users across the continent are content to use diesel generators for the time being, the high prices of this fossil fuel (which has been cast into greater scrutiny under the global energy crisis due to the war in Eastern Europe) and the startling emissions the generators produce means that, as the rise of renewables continues, consumers may look elsewhere to meet their energy requirements. In the face of this, in order to secure their long-term security, most manufacturers have turned their attention to these concerns and are developing new solutions to deliver equipment with higher efficiency and less climate impact.

Volvo Penta, for instance, has recently extended is power generation engine range with the introduction of the D17, its most powerful genset engine to date. In the accompanying press release, Volvo Penta was clear to put its fuel efficiency at the centre by explaining how the D17 offers up to 5% less fuel consumption per kWh than its lower-displacement D16 sibling – a feat it has achieved through recent evolutions in combustion technology such as the modernisation of the fuel-injection system with a common-rail design. The company added that, looking ahead, the D17 (alongside the rest of the company's power generation line-up) will evolve to enable customers to transition to significantly lower emissions. "We are taking our power generation offer to the next level by extending the range while developing new technologies to achieve net zero value-chain emissions," said Hannes Norrgren, president of Volvo Penta Industrial.

There has also been a drive for engines to function utilising other types of fuel alongside diesel in order to reduce emissions. Cummins has demonstrated this in recent months by announcing that its QSK95 engine can be safely used with renewable diesel. Hydrogenated Vegetable Oil was chosen after Cummins began working to implement this shift – a fuel that can reduce carbon intensity by up to 90% compared to conventional diesel fuel. The HVO can also be blended and used in any proportion with diesel allowing for ease of transition and its use within the engine has been touted as a strong example of Cummins' commitment to developing solutions that enable decarbonisation and helping customers minimise their footprint.

Similarly, at Bauma 2022, Kohler Power Systems was eager to showcase that it had recently approved use of Hydrotreated Vegetable Oils for all of its diesel engines after intensive laboratory and on-field testing. Kévin Bougault, product manager at the company, explained on the stand that users can use this fuel on current engines and blend at whichever percentage desired. The company also displayed the R550C5 which was released that year. The R550C5 rental compact genset with Stage V compliance is integrated into the M5228 module of the Rental Compact range to create mobile generating sets dedicated to demanding rental applications, providing 500kVA PRP / 550kVA ESP, while ensuring a reduction in polluting emissions. "The Stage V range is now only targeted at the European markets but, for sure, in the next few years we would like to bring it to Africa and everywhere else where there are ambitions to lower carbon emissions," Bougault commented.

For many, progress along this journey ultimately leads to a fuel that is widely seen as the future bedrock of the energy industry and perhaps society as a whole; hydrogen. As early as 2019, the IEA analysed the trajectory of this fuel source and stated that it was enjoying 'unprecedented political and business momentum' and, nearly four years on, little of impetus has been lost. For example, the European Commission has proposed to produce 10 million tonnes of renewable hydrogen by 2030 and to import a further 10 million tonnes by the same date. In keeping with this, many manufacturers are re-assessing their engines to ensure their viability with this fuel of the future. At the start of 2023, RollsRoyce announced that it has successfully conducted tests of a 12-cylinder gas variant of the mtu Series 4000 L64 engine running on 100% hydrogen fuel. The tests carried out by the Power Systems business unit showed very good characteristics in terms of efficiency, performance, emissions and combustion. The company explained that these tests mark an

important step towards the commercial introduction of hydrogen solutions to meet the demand of customers for more sustainable energy supply. Tobias Ostermaier, president – stationary power solutions, Rolls-Royce Power Systems, explained, "This engine will serve the market demand for hydrogen solutions in the energy transition and will be available to our customers as a reliable and clean power source for gensets and combined heat and power plants."

Caterpillar, which has noted its diesel-fuel power solutions have enabled operation on various HVO fuel products for more than a decade, has also moved into the hydrogen sphere. As early as 2021 the company announced it will begin offering gensets capable of operating on 100% hydrogen, including renewable green hydrogen. It is a move, it stated, that was taken with the aim of helping customers meet their carbon-reduction goals with high-performing, cost-effective technologies.

While it may be many years until the hydrogen market develops on the African continent and users can reliably secure this source to power their equipment, it is becoming increasingly clear that the hydrogen future is intrinsically linked with the continent. Seen as a potential 'bread basket' for green hydrogen due to the abundance of renewable resources, in recent years there has been significant interest – often translating into investment – to develop the hydrogen-producing capacity in key areas such as Namibia, Kenya, Egypt, Morocco and South Africa. As this accelerates and the drive to reduce emissions increases, the accessibility of the fuel to businesses and people living there will increase so that the prospects of hydrogen gensets will also rise.

CONCLUSION

In times of global oil & gas uncertainty and the unwavering rise of renewables – where Africa is irrevocably a focal point – it is perhaps somewhat surprising that the continent's diesel genset market is undergoing such a period of stability. Owing predominantly to the electrification problems plaguing the continent and the reliable reputation that the equipment has earned over the years of faithful service, the market is not only expected to remain firm but in fact grow, with market projections estimating it could grow at a CAGR of 2% to as high as 6% in the coming years. While this is promising news for the companies delivering and servicing this equipment across the continent, the awareness that these market dynamics will not hold true forever is apparent. The decision by most, therefore, to embark on developments within the spheres of alternative fuels and hydrogen is a wise one and, given the growing presence of net zero ambitions worldwide, making use of these prosperous years to secure a long-term future is paramount.

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