aggreko

Zero routine flared gas by 2030: A pipe dream or a potential reality?

WHITEPAPER



Understanding how to harness the power of flare-to-power solutions for a sustainable energy future



Table of contents

Introduction: Making a sustainable future for oil and gas 3

Understanding flaring and its impact 4

The energy trilemma and flare-to-power solutions 5

Overcoming challenges in using flare gas 8

Aggreko's sustainable energy solutions 11

Aggreko solutions, your future 12

Solutions in action: A flare-to-power first for Oman 13

Embracing Flare-to-Power Solutions for a Greener Future 14

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The oil and gas industry today is grappling with formidable challenges and compelling opportunities, both of which require sustainable solutions.



A pressing concern that demands immediate attention is the practice of flaring, which has emerged as a significant environmental and economic dilemma.

Globally, 139 billion cubic metres (bcm) of natural gas is flared annually, giving rise to a cascade of adverse consequences. The emission of carbon dioxide (CO_2), methane, and black soot not only accelerates climate change, but also poses serious threats to human health.

In the pursuit of a more environmentally conscious and resilient future, the Net Zero Emissions by 2050 (NZE) Scenario has set a transformative target: the complete elimination of non-emergency flaring on a global scale by 2030.

This ambitious objective not only aligns with the goal to cut down on greenhouse gas emissions – it also potentially circumvents the release of an estimated 365 million metric tons of CO_2 equivalent into the atmosphere.

Achieving this goal would result in a remarkable 95% reduction in flared gas volumes, representing a pivotal stride toward sustainability.

This whitepaper will explore:

- Flare-to-power solutions and their impacts both today and in the future
- Their pivotal role within the broader context of the energy trilemma – a balance between energy security, energy equity, and environmental sustainability
- The untapped potential of converting flared natural gas into a resource for generating power and aiding sustainable energy transitions

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Flaring is an integral yet contentious practice within the oil and gas industry. Because of its numerous implications for the environment and the economy, it requires thorough discussion and careful practice.

In short, flaring involves the controlled combustion of natural gas that cannot be captured or used during oil extraction and processing. This is widely considered as a safety measure to prevent the accumulation of potentially explosive gases.

To aid in the prevention of releasing more greenhouse gases into the atmosphere, there have been small victories so far. Recent data reveals a modest decrease in global gas flaring, with volumes falling by approximately 5 billion cubic meters (bcm) to reach 139 bcm in 2022 – a marginal 3% reduction.

Despite this decrease, research shows that flaring was still accountable for a staggering 500 million metric tons of CO_2 equivalent in annual greenhouse gas emissions in 2022, further exacerbating climate change.

Nearly 70% of the flared gas is used in flares that burn continuously, known as 'routine flaring' when flaring is operating more than 85% of the time. This presents a dire inefficiency and a needless contributor to carbon emissions.

As a result of further research and public pressure, oil and gas companies are increasingly recognising the need to reduce flaring and align their strategies with environmental as well as economic goals.

This shift towards mitigation is accelerated by the fact that the energy transition landscape is witnessing a growing number of companies pledging commitments to curtail flaring.

Industry giants are increasingly integrating the reduction of flaring into their sustainability agendas, converging their corporate interests and environmental responsibilities, balancing both the future of the planet and the corporate bottom line.



The global reduction in flaring, while indicative of progress, is only a preliminary step in addressing the issue's enormity.

In the realm of solutions, Aggreko emerges as a significant player, offering support to clients during the preliminary stages of project pre-qualification. By providing solutions from the outset, Aggreko aids in circumventing flaring-related challenges, contributing to a more comprehensive approach to project planning and execution.

As a solution provider, Aggreko offers support to clients during the very early stages of project pre-qualification.

Ultimately, the collaborative efforts of Aggreko and the oil and gas industry will aid current commitments to reduce flaring, and use any required flare gas more wisely



Balancing energy security, environmental sustainability, and energy equity

The energy trilemma is characterised by a complex balance of three distinct factors – energy security, environmental sustainability, and energy equity.

This in turn means the trilemma aims to overcome multiple challenges:

1. Reconciling the paramount need for reliable and affordable energy

2. The urgency of mitigating climate change and environmental degradation

3. The equitable distribution of energy resources

As societies and economies navigate this series of obstacles, the role of flaring within the oil and gas industry emerges as a significant contributor to this multifaceted challenge.

The role of flaring in the energy trilemma

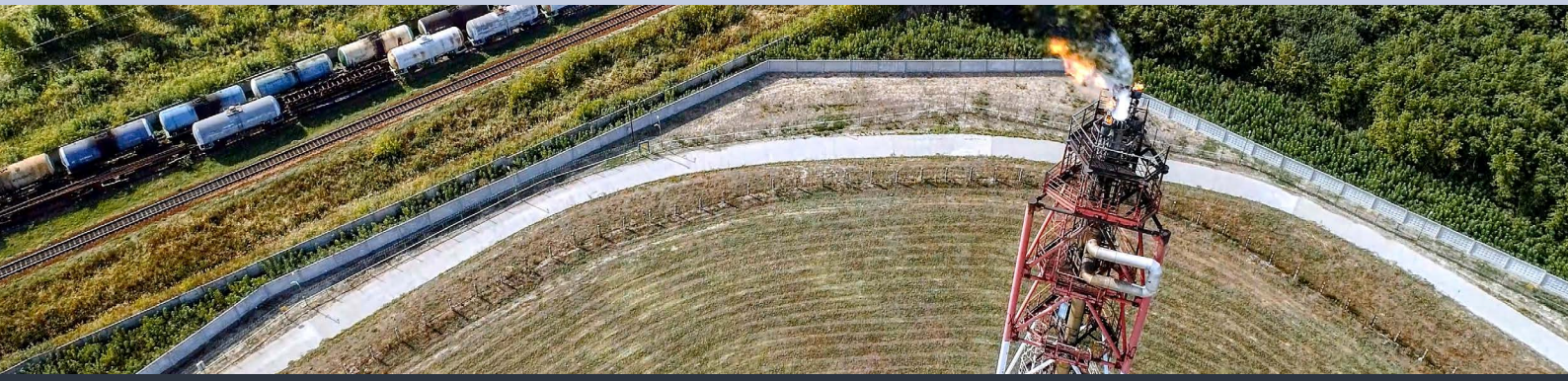
As an ongoing practice in the oil and gas sector, flaring intersects with the energy trilemma.

Flaring is important as it prevents the accumulation of combustible gases, while ensuring the safe operations of extraction and processing activities.

However, this gives rise to a conundrum that directly challenges environmental sustainability and energy equity.

The combustion of vast volumes of natural gas during flaring translates into substantial greenhouse gas emissions, contributing to climate change and environmental degradation.

Moreover, flaring signifies an inefficient usage of valuable energy resources, standing in stark contrast to the principle of energy equity that advocates for access to energy for all.



The flaring landscape in 2023: present state, aspirational goals, and pathways forward

Today, the flaring landscape portrays a mixed picture. Last year, there was a 3% reduction in global gas flaring compared to the previous year, even despite global oil production increasing by 4% in the same period.

Flaring remains responsible for an annual emission of around 500 million metric tons of CO_2 equivalent.

Nine countries are responsible for the vast majority of flaring — Russia, Iraq, Iran, Algeria, Venezuela, the United States, Mexico, Libya, and Nigeria. Together, these flaring countries account for nearly 75% of flare volumes, and just under half of global oil production.

And yet, if flare-to-power solutions were put in place, the amount of gas flared in 2022 would be able to generate as much electricity as the African continent currently produces in one year.

So while it's important for the energy industry to transition towards sustainability, as envisioned in the Net Zero Emissions by 2050 Scenario, it's also vital that any essential flaring is used effectively and efficiently to ease this transition for oil and gas companies.





How flare-to-power solutions answer the energy trilemma

Flare-to-power solutions can help to make the most out of a financially and environmentally difficult situation.

These solutions present an innovative, sustainable avenue to address the energy trilemma by capitalising on the latent energy potential of flaring.

Rather than squandering vast volumes of associated gas as a waste product, flare-to-power solutions harness this resource to generate electricity, transforming a wasteful practice into a source of clean energy.

The strategic integration of flare-to-power solutions aligns seamlessly with the tenets of the energy trilemma:

1. **Energy security**
   Flare-to-power solutions bolster energy security by optimising the usage of resources that would otherwise be lost.

2. **Environmental sustainability**
   By curbing flaring, these solutions significantly diminish emissions, bolstering environmental sustainability efforts.

3. **Energy equity**
   The adoption of flare-to-power solutions promotes energy equity by redirecting valuable energy resources towards productive and accessible ends, and therefore contributing to a more equitable distribution of energy benefits.

In addition, the implementation of flare-to-power solutions aligns closely with the economic interests of oil and gas companies, by offering the opportunity to optimise the total cost of energy by capitalising on the energy content of flared gas.

This not only addresses the environmental concerns of flaring – it also brings about more economic efficiencies, a critical consideration in the evolving energy landscape.

Flaring as the way forward to solving the energy trilemma

Flare-to-power solutions emerge as a promising avenue to reconcile these seemingly divergent objectives of energy security, environmental sustainability, and energy equity.

By transforming the wasteful practice of flaring into a resource for clean energy generation, these solutions provide a practical means to address the energy trilemma while also aligning with the interests of the oil and gas industry.

As the world races towards sustainable energy transitions, the potential of flare-to-power solutions signifies a harmonious convergence of environmental stewardship, economic shrewdness, and equitable energy provision.



It's clear that flare-to-power solutions hold transformative potential for the oil and gas industry, offering a sustainable means to address the persistent issue of flaring.

However, despite the benefits of these solutions, common concerns and fears among oil and gas companies often act as barriers to the adoption of these innovative solutions.



Addressing common concerns and fears

Feasibility

One of the prevalent concerns of flare-to-power solutions is related to the feasibility of using flaring as an energy source.

Many oil operators lack the necessary infrastructure to effectively capture and use the gas that is flared during their operations.

As a result, this valuable resource goes to waste, often without a clear understanding of its composition or potential utility.

Reliability

Reliability is another recurrent concern among oil and gas companies.

Operators who intermittently engage in flaring are apprehensive about relying on such sporadic sources of energy for their main power needs.

This fear stems from the unpredictability associated with intermittent flaring and its potential impact on continuous power supply.

Aggreko's strategic approach

Aggreko, as a pioneering solution provider, recognises and addresses these concerns, with a comprehensive approach to ensure the maximum availability and reliability of flare-to-power solutions.

From conceptual discussions to practical implementation, Aggreko is capable of advising oil and gas companies throughout the multiple stages of a flare-to-power project.

One of Aggreko's distinctive strategies involves instilling a commitment to 100% availability and 100% reliability in clients. By helping clients recognise the potential of their flared gas as a consistent energy resource, Aggreko contributes to minimising the wasteful practice of flaring while concurrently offering a dependable power source.



How can Aggreko appease companies' concerns about flare-to-power?

Aggreko leverages cutting-edge technology and innovative practices to appease fears and concerns.

For instance, to alleviate worries about declining volumes of gas, Aggreko engages with clients to develop solutions that align with environmental goals, ensuring that the extracted gas is used to its fullest potential.

When it comes to the quality of flared gas, Aggreko implements advanced measures – such as installing on-site gas chromatographs to provide real-time gas analysis and offer real-time insights into gas composition.

This process occurs at a rapid interval of every seven minutes, assuring clients of the consistent and verified quality of the gas supplied to the power plant.





Building trust through proven expertise

Aggreko's success in mitigating these concerns is underpinned by a robust track record of providing flare-to-power solutions across the globe and spanning a diverse range of projects and geographical contexts.

In 2021, Aggreko registered a record 2GW of live global gas power capacity, as well as enormous growth in the number of flare and stranded gas to power projects.



"Flare gas serves no productive purpose yet accounted for around 500 million tons of all CO_2 equivalent emissions in 2022 – enough to power Sub-Saharan Africa. This wasted energy can be repurposed to supply electricity in countries that need it the most, and we are working with customers around the world to provide solutions to deliver such services to a range of projects and requirements."

Hesham Elshamy, Sector Manager, Aggreko AMEA Oil & Gas

Together, this has solidified Aggreko's reputation as a trailblazer in the arena of flare-to-power solutions. As a trusted partner in addressing flare gas utilisation challenges, Aggreko translates them into practical, reliable, and efficient outcomes, and fosters a future where waste is transformed into opportunity.

Around the world, in almost every country, company, and industry, there is more pressure than ever to ensure that day-to-day practices are made as sustainable and planet-conscious as possible. **Aggreko is no different.**

Aggreko's pivotal role as a reliable and innovative solution provider means focusing on tailored flare-to-power solutions for oil and gas clients, underscored by its commitment to environmental sustainability and efficient energy practices.

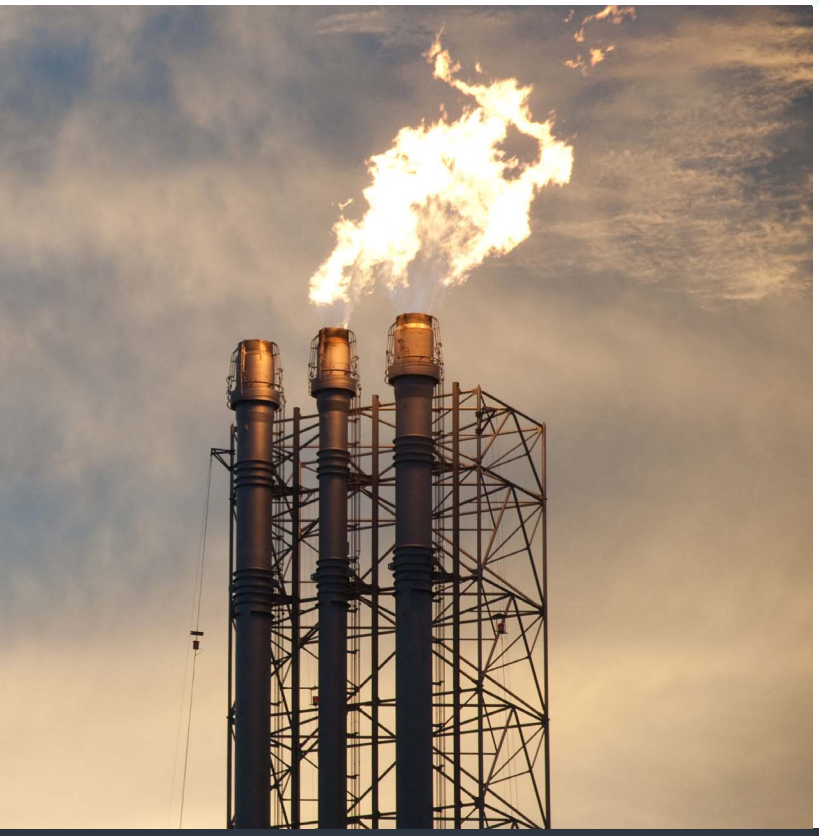
Aggreko's flare-to-power solutions: engineering excellence

At the heart of Aggreko's sustainable energy endeavours lies its distinction as an all-encompassing solution provider, owning the technology and engineering processes necessary for delivering optimal flare-to-power solutions.

This internal capability provides Aggreko with a distinct advantage, allowing the company to exercise direct control over the entire development process, from conception to execution.

This ensures seamless integration of technology and engineering expertise, resulting in bespoke solutions tailored to each client's unique requirements.





Modularity and scalability: unprecedented flexibility

One major attribute of Aggreko's approach to flare-to-power solutions is its deployment of modular units. These units are not only scalable; they can adjust to accommodate fluctuations in flare gas availability. This adaptability is a hallmark of Aggreko's commitment to customer-centricity and problem-solving prowess.

Unlike many other solution providers, Aggreko's proprietary technology and extensive fleet empower the company to respond rapidly to changes in flare gas volumes.

This ability to seamlessly scale up or down in response to changes in power demand or gas availability is a distinctive feature that positions Aggreko as a leader in the industry.

Best practices for seamless transitions to flare-to-power solutions

Aggreko's successful flare-to-power implementations are guided by a comprehensive understanding of the factors crucial to a seamless transition.

The company possesses the expertise to navigate challenges associated with variations in the composition and volume of flare gas. For example, when gas volume diminishes, Aggreko offers a phased reduction in flare, ensuring a controlled transition.

Conversely, if gas volumes are projected to increase, Aggreko provides a proactive scaling-up process with meticulous planning, ensuring a continuous and reliable power supply.

This strategic approach shows Aggreko's commitment to mitigating potential disruptions while optimising resource usage.

Aggreko's vision for environmental sustainability and renewable integration

Aggreko's commitment to sustainability extends beyond its immediate operational boundaries. The company envisions a future that combines environmental stewardship and renewable energy integration.

As a testament to this commitment, Aggreko invests in hybrid solutions that combine flare gas with renewable energy sources for optimal energy generation.

This bold approach signifies Aggreko's dedication to finding new and improved pathways that harness diverse energy sources while minimising their environmental impact.

Aggreko's engagement with major International Oil Companies (IOCs) in oil-producing regions underscores the company's proactive stance in fostering sustainable practices, as well as discussions surrounding the hybridisation of existing power plants.

As an end-to-end solution provider, Aggreko's modular approach, adept at accommodating fluctuations in flare gas availability, underscores its commitment to flexibility and reliability.

Above all, Aggreko's visionary outlook manifests in its investment in hybrid solutions. This not only bridges the gaps between conventional and renewable energy sources for a more sustainable future – it also takes a firm position on the frontlines to usher in a new era of energy efficiency and environmental responsibility.



One milestone achievement in Oman's move towards flare-to-power was Aggreko's pioneering solution for addressing flaring challenges within the country's oil and gas sector.

Facing issues related to flaring inefficiencies and environmental concerns, the Omani government collaborated with Aggreko to transform flared gas into a productive energy source.

Aggreko introduced a bespoke flare-to-power solution in one of the country's critical oilfield areas, involving the deployment of modular, adaptable units. These units harnessed the gas typically flared during oil production to generate electricity.

Aggreko's all-encompassing approach, involving in-house technology and engineering, facilitated seamless integration. Crucially, the modular solution allowed for adjustments based on fluctuations in gas volume to ensure a steady power supply.

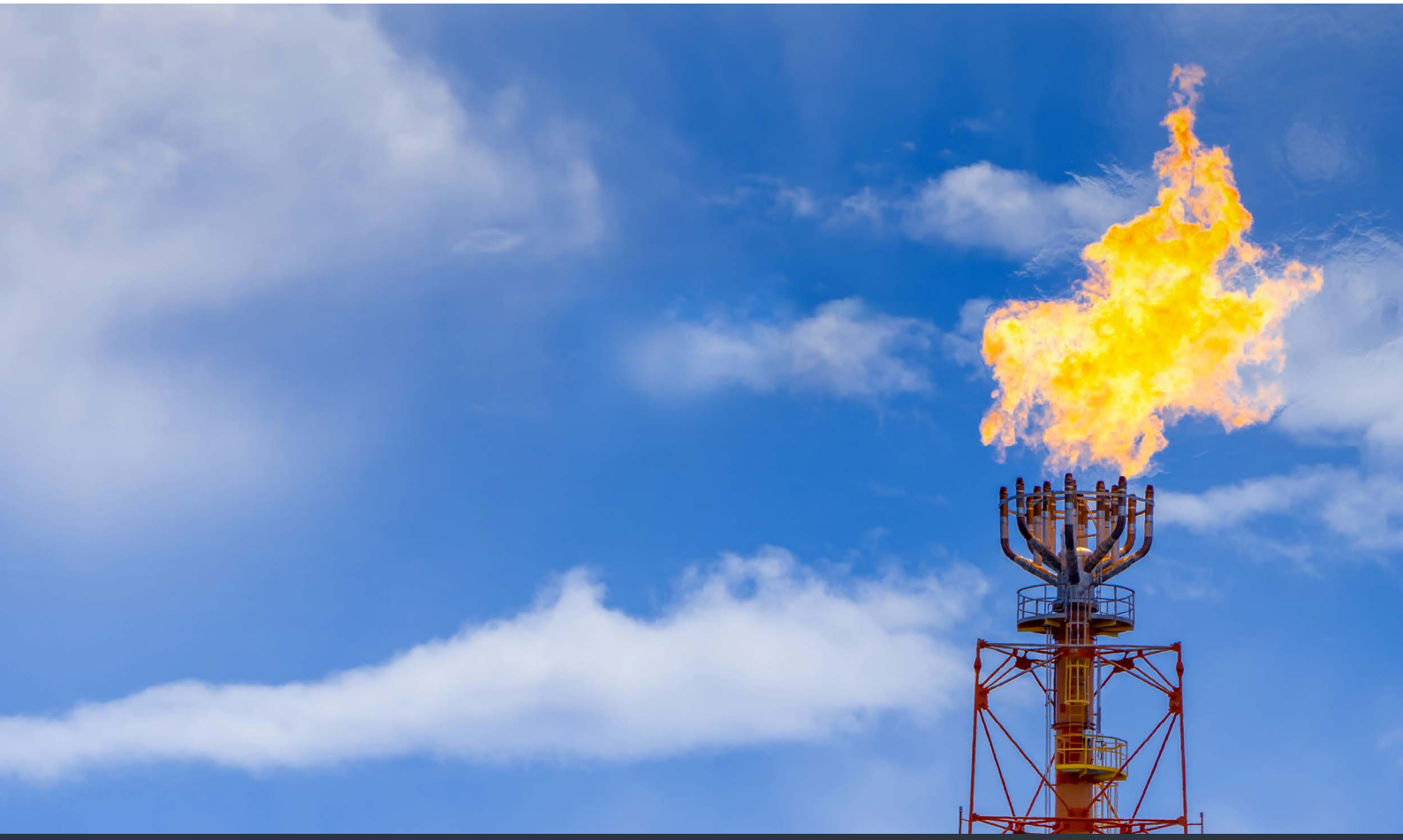
This initiative yielded significant environmental benefits by curbing emissions associated with flaring.

The project also showed Aggreko's commitment to sustainability, aligning with global energy transition goals. The success of the project was reflected in a substantial reduction in CO_2 emissions, demonstrating the tangible impact of Aggreko's flare-to-power solution.

In addition, the project also brought significant cost savings for the IOC of over $600,000 USD per year for the company.

By addressing complex energy challenges, Aggreko offered a sustainable avenue for Oman's oil and gas industry to harness flared gas for productive energy generation.

Thanks to superior technology, tailored solutions, and a commitment to environmental responsibility, Aggreko's initiative in Oman serves as a model for other regions grappling with the detrimental effects of flaring.





Flare-to-power solutions present a practical conduit for addressing the energy trilemma, offering a tangible remedy to wasteful flaring practices while enhancing energy availability.

The significant reduction in greenhouse gas emissions, exemplified by the NZE Net Zero Emissions Scenario, underscores the profound environmental impact of adopting flare-to-power solutions.

Aggreko's technology, modular units, engineering proficiency, and adaptability are standalone proof of the viability, efficiency, and reliability of flare-to-power solutions.

For oil and gas companies, embracing flare-to-power solutions as they aim to reduce wasteful flaring practices has become a key part of their shared responsibility for the planet's well-being. By optimising flared gas usage, these solutions align economic viability, environmental responsibility, and sustainable energy provision.

Flare-to-power solutions are now beckoning stakeholders – from industry leaders to policy makers – to rise to the challenge of transformative change.

As we look ahead, the vision of a greener, more sustainable energy landscape becomes not only a possibility but a shared destiny that hinges on the decisions and actions we take today.

The road to zero routine flared gas by 2030 is not just a pipe dream – it is an aspirational reality that beckons us towards a future where oil and gas companies are able to comprehensively answer the puzzles of energy, environment, and equity.

With Aggreko's resounding success at the forefront, the oil and gas industry is presented with a tangible roadmap for change.

So the time to step into this future is now. Join Aggreko's mission to forge a path towards a greener, more sustainable tomorrow.

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