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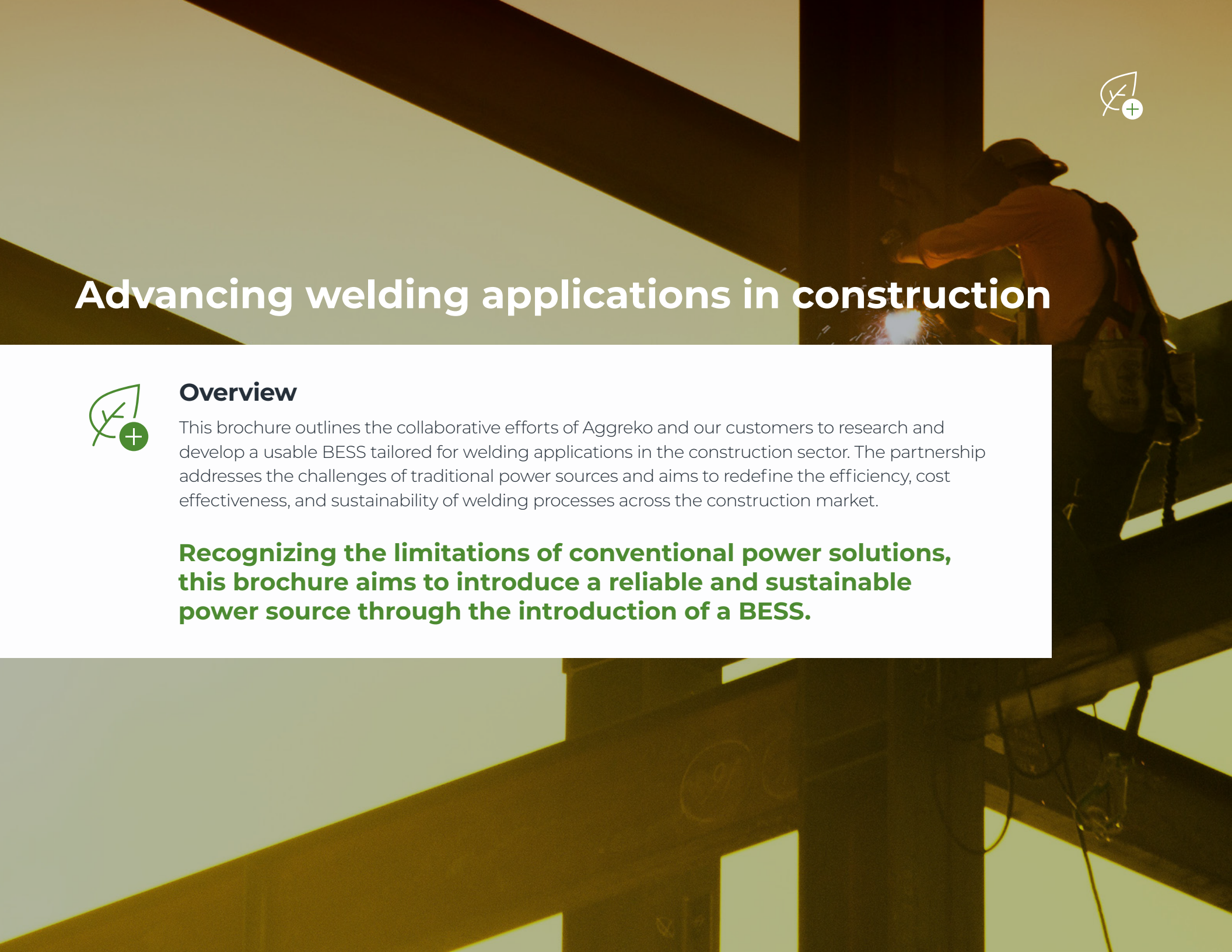
Battery Energy Storage Solution (BESS) for Welding Power

An assessment to predict the usability, cost and emissions output of a BESS for welding applications



Advancing welding applications in construction

Overview

This brochure outlines the collaborative efforts of Aggreko and our customers to research and develop a usable BESS tailored for welding applications in the construction sector. The partnership addresses the challenges of traditional power sources and aims to redefine the efficiency, cost effectiveness, and sustainability of welding processes across the construction market.

Recognizing the limitations of conventional power solutions, this brochure aims to introduce a reliable and sustainable power source through the introduction of a BESS.

Market analysis

A comprehensive analysis of the construction market and welding applications reveals existing challenges, such as:

- Dependency on diesel power generators
- Lack of site or “construction” power
- Environmental concerns related to emissions
- Limitations in mobility and adaptability

Battery Energy Storage System (BESS)

BESS is a sophisticated technology designed to store electrical energy for later use, offering a flexible and efficient solution to address the intermittent of renewable energy sources and enhance grid stability. BESS stores excess energy generated during periods of low demand and releases it during peak demand or when renewable sources are not generating power. This enables Aggreko to balance supply and demand, mitigate fluctuations, and improve overall energy reliability. A BESS plays a pivotal role in supporting the integration of renewable energy into power grids, providing a responsive and scalable means of storing and deploying electricity, thus contributing to a more resilient and sustainable energy infrastructure.

The BESS developed by Aggreko

- Portable and scalable power for welding applications
- Reduced emissions and environmental impact
- Enhanced flexibility and adaptability on construction sites
- Reduce total operating cost of welding applications requiring alternative power
- Operate on grid power “trickle charge” while BESS allows for “larger load”
- When operating with generators solely, the generator shall run at “optimal load” at all times, whereas the implementation of BESS will decrease fuel usage, reduce emissions, and reduce operational down time

Research and Development (R&D) Process

Aggreko's R&D process for optimizing welding power requirements began with a meticulous analysis, delving into the intricate details of the energy needs associated with welding operations. Through the strategic placement of power analyzers on active weld packs, Aggreko gathered real-world data, allowing for a detailed understanding of power consumption patterns and peak demands. This comprehensive analysis laid the groundwork for the subsequent stages of our R&D.

Following the insightful analysis, Aggreko transitioned into the prototyping phase, developing and testing BESS components designed to enhance energy efficiency during welding.

The team leveraged the data obtained from power analyzers to inform the design and functionality of these components. Subsequent validation involved BESS and Generator paralleling capabilities through Load on Demand and Auto Start Features; ensuring the reliability and adaptability of the BESS components to diverse welding scenarios.

The R&D process has reached its pinnacle, and is ready to commission field studies, where the BESS technology is integrated into actual welding environments, affirming its practical feasibility and readiness for widespread adoption.

This systematic approach, from in-depth analysis to real-world trials, underscores Aggreko's commitment to innovation and excellence in optimizing welding power requirements.

Case studies

In a series of compelling case studies, the implementation of BESS in construction projects has yielded remarkable results, showcasing enhanced efficiency, substantial cost savings achieved through reduced fuel consumption, and a commendable positive environmental impact characterized by lower emissions. In alignment with a strategic Great, Greater, Greatest approach, Aggreko has meticulously identified three prospective solutions for seamlessly integrating BESS systems into welding applications.

These solutions include the incorporation of BESS within a generator right-sizing process, the utilization of Tier 4 Final power generators coupled with BESS, and BESS integration with grid capabilities. The anticipated reduction in emissions resulting from these innovative approaches is a pivotal focus, promising a tangible step towards sustainable and environmentally conscious practices within the welding industry.

The standard solution

Hired Equipment is quite often running at loads less than 30% of generator maximum load capacity which means the generator is operating inefficiently. However if we design solutions where the equipment is running at optimal load on a regular basis, then we can offer significant savings in fuel, carbon, and other local emissions.

Right sizing in the welding application with a generator is not a “good” solution based on the load variations of the welding application. Therefore in most cases, for welding, the industry has turned to having oversized generators, or Tier 2 and Tier 3, that are outdated and offer a much greater emissions output, than new technologies.

Diesel Generator

Tier 2 or Tier 3

The Great Solution: Tier 4 Final

Specifically designed to cut down on harmful pollutants. Aggreko's T4F generators comply with the most stringent requirements set out by the US EPA for engines. These are specifically designed to limit carbon monoxide, nitrogen oxides, and particulate matter to provide efficient low-carbon and low-noise temporary power. The T4F solution in the welding application is estimated to provide a 70% reduction in CO_2, 94% reduction in particulate matter, and 98% reduction in NOx. While ultimately reducing the overall emissions output, the T4F solution also is estimated to reduce fuel consumption by 51% or greater over the life of a temporary installation.

Tier 4 Final

Load on demand configuration (LOD)

STAGE III^
LOD

DIESEL

Tier 4 Final + Battery

Load on demand configuration (LOD)

STAGE V
LOD

HVO

98% ↓ NOx

94% ↓ PM

70% ↓ CO_2

51% ↓ FUEL

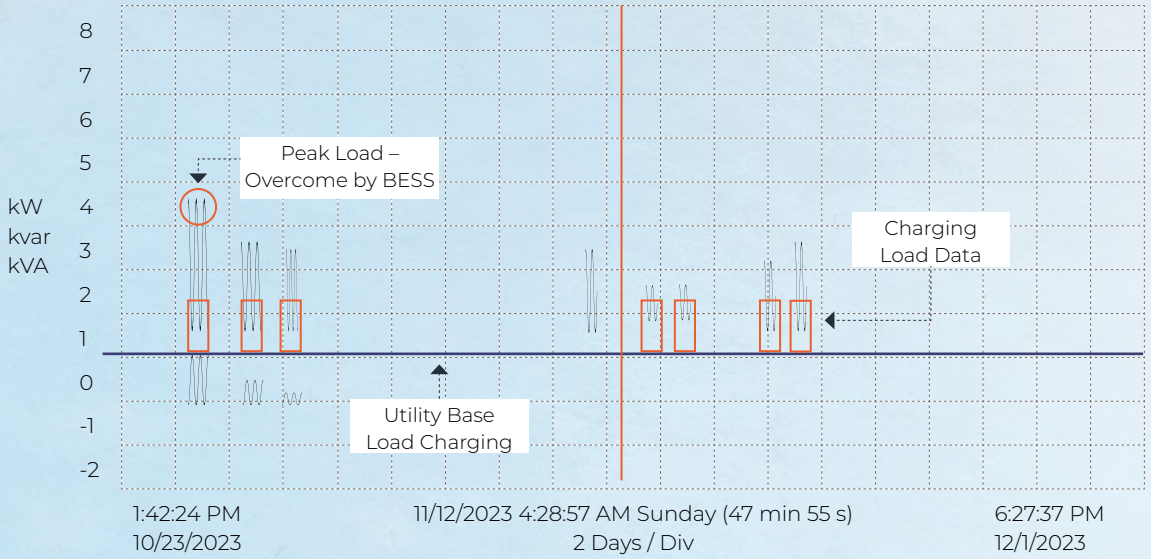
Please note these savings are approximate.

The Greater Solution: T4F Hybrid Solution

A modular battery hybrid option providing dependable, consistent power for improved operational performance, while reducing cost and carbon footprint for the welding application by an estimated 50%. With a hybrid solution that combines T4F generators and battery storage, fuel is only used when it's needed most. Through a fully automated system, the generator can turn off during non-peak hours or at night, and the battery system can provide the required power.

The Greatest Solution: Tier 4 Final + Battery + Utility Power

Our “Greatest Solution” is designed to use electrical distribution with grid power, where available. Once site specific power feasibility tests are ran and power data is collected, Aggreko expert electrical engineers design a tailor-made power distribution plan based on the findings. For the welding application, this would require a grid feed of 40AMPs available to power the BESS system. This requirement will change from application to application.



Future Implications and Potential Applications

The collaboration and integration of BESS outlined in this brochure ushers in a new era of possibilities, shaping the future implications and potential applications within the construction industry. Beyond the initial successes observed in specific projects, these advancements pave the way for a broader expansion into various construction applications. The adaptability and versatility of BESS allow for seamless integration with emerging construction technologies, offering a synergistic relationship that enhances efficiency, data-driven decision-making, and overall project optimization. Moreover, the adoption of BESS signifies a commitment to advancements in sustainable and eco-friendly construction practices, aligning with the industry’s evolving ethos towards reducing carbon footprints. This forward-looking approach not only addresses immediate energy storage needs but also positions the construction sector at the forefront of environmentally conscious and technologically integrated practices.

In light of these future implications, the collaboration between BESS and construction technologies offers a transformative pathway, fostering innovation, sustainability, and resilience within the construction industry.

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As the construction sector continues to evolve, the integration of Aggreko BESS stands as a cornerstone for driving positive change, establishing a blueprint for a greener, more efficient, and technologically sophisticated construction landscape.

Acknowledgments

We express gratitude to all parties involved in this collaborative effort, contributing to the advancement of welding applications in construction.

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