

A large-scale construction site featuring several tall yellow tower cranes and a red crane against a blue sky with light clouds. In the background, multiple high-rise buildings are under construction, showing concrete frameworks and some brickwork. The scene is set in an urban environment.

aggreko

Greener Upgrades in Construction: City Centres

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Supporting our customers

through the Energy Transition

The supply of temporary power and temperature control to major city construction projects is essential for sustainable recovery and growth. This issue is especially important as the sector hits its highest rate of activity in 24 years.¹

UK construction has made considerable progress on sustainability in recent years, with many of the sector's biggest names acknowledging the need to adopt newer approaches and more efficient systems. Some, like Mace for example, have begun to deploy equipment running on alternative fuels as a way to guarantee annual emissions targets.² While others, like Wilmott Dixon, have sought improvements across the entire business, including cuts to on-site fuel use, office energy consumption and a more sustainable approach to transport.³

Positive steps like these, however, must be managed against commercial commitments, not to mention the practicalities of large-scale construction projects. Given these challenges, it's clear that collaboration at a local level will be key to achieving ambitious carbon reduction targets while also maintaining the bottom line. This not only means supplying greener equipment but also offering expertise where necessary to improve the build process. Indeed, as Construction News points out, major firms are now calling on their supply chains for greater support in order to make meaningful carbon reductions and steer the wider sector towards a more efficient future.⁴

But supplying sustainable power is only one piece of the puzzle. Along with lowering emissions, many local authorities are now also introducing clean air zones to combat the levels of harmful particulate matter found in city air.⁵ This is forcing organisations working in city centres to rethink how on-site equipment is powered, particularly wherever red diesel is the main fuel source.

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1. <https://constructionglobal.com/construction-projects/uk-construction-sector-hits-24-year-high>
 2. <https://www.constructionenquirer.com/2021/03/16/mace-sites-to-switch-to-zero-emission-hydrogen-generators/>
 3. <https://www.constructionenquirer.com/2021/03/29/wilmott-dixon-acclaimed-for-green-supply-chain/>
 4. <https://www.constructionnews.co.uk/contractors/balfour-beatty/balfour-beatty-needs-supply-chains-help-to-slash-carbon-10-12-2020/>
 5. <https://citymonitor.ai/horizons/cities-across-globe-are-leading-charge-clean-air-policies-british-ones-can-do-more-4090>

Greener Upgrades from Aggreko

As a Global energy provider, we are committed to developing and promoting cleaner energy solutions which reduce carbon emissions. We introduced Greener Upgrades, an initiative developed to help business in making simple choices that are kinder to the environment. These small switches make a big difference in lowering NOx, Particulate Matter and CO2 emissions and reducing fuel consumption.

Our investment in new technologies such as Stage V generators, Battery Energy Storage Solutions (BESS) and alternative fuels, alongside our consultative approach, delivers sustainable solutions for our customers that improve efficiencies and lower costs.

Through innovation and a consultative approach, Aggreko will support UK construction by offering greener, more efficient equipment. The business will also provide its expertise where necessary to increase the efficiency of each build, in turn helping the sector to meet its commitment on climate. This guide explores what options are available for inner city projects and where key improvements can be made when compared to traditional approaches.



Green Construction Challenges in the UK

Data shows that most of the construction projects commenced in 2020 were found in major cities.⁶ Yet many of these areas now have or are expected to introduce clean air zones to limit the amount of dust, nitrogen oxide and particulate matter found in local air. Without necessary changes these regulations will continue to challenge the sector, especially as the drive to cut carbon emissions gathers pace.

Birmingham

Number of projects: **188**

Green challenges: **Clear air zone introduced on June 1, 2021**

Bristol

Number of projects: **161**

Green challenges: **Clean air zone expected in 2021**

Leeds

Number of projects: **219**

Green challenges: **Proposed clean air zone scrapped but local authority exploring standards tougher than national standards**

Manchester

Number of projects: **213**

Green challenges: **Central government has directed Greater Manchester to introduce a clean air zone**

Liverpool

Number of projects: **130**

Green challenges: **Clean air zone in consultation**

Stoke on Trent

Number of projects: **205**

Green challenges: **Central government has directed the council to reduce illegal levels of NOx in parts the city**

Nottingham

Number of projects: **187**

Green challenges: **City council cancelled plans to introduce a clean air zone but like Leeds is exploring other options**

London

Number of projects: **1,656**

Green challenges: **Ultra Low Emission Zone introduced April 2019**

6. <https://www.project-resource.co.uk/blog/2020/01/construction-stats-top-20-uk-busiest-towns-and-cities-in-2020>

Greener Alternatives by Application

Read ahead to see the
potential sustainability
results you can achieve.



1

Tower Cranes

Cranes rely on electricity provided by the mains, or an on-site generator. They consume a high amount of energy, with the average electrical tower crane using 800 amps (244 kW, 208V).

⚡ **Power requirement: 500 kVA**

Switching to **HVO** delivers:

- **Up to 90% reduction in CO₂**
- **Reduces local emissions by 15-25%**

Switching to **hybrid** and **right sizing** the generator can deliver:

- 65% reduction in fuel consumption
- A further 65% reduction in local emissions
- Up to 65% reduction in CO₂
- Significantly reduced dBA when running off battery

2

Delayed Utility

⚡ **Power requirement: 2 MVA**

Switching to **HVO**:

- **Up to 90% reduction in CO₂**
- **Reduces NOx & PM by 15-25%**

Switching to **hybrid** and **load on demand package** of **3 x 600 kVA Stage V generators** can deliver:

- 55% reduction in generator fuel consumption
- A further 55% reduction in generator emissions
- A further 55% reduction in CO₂
- Significantly reduced dBA when running off battery

3

Utility Diversion

Diverting existing utilities requires intermittent levels of power throughout the day and typically involves diesel power generation.

4

Temporary Heating

(Comfort heating, underfloor heating, OEM delays, maintenance and breakdowns)

🔥 Heating requirement:

**500 kW boiler
& 125 kVA generator**

Switching to **HVO**:

- Up to 90% reduction in CO₂
- Reduces NOx & PM by 15-25%

Switching to a **hybrid** and **right sizing** the generator to **60 kVA Stage V** (which is powering the boiler) can deliver:

- 40% reduction in generator fuel consumption
- A further 40% reduction in generator local emissions
- A further 55% reduction in CO₂
- Significantly reduced dBA when running off battery

5

Cooling for Commissioning of Heating System

❄️ Cooling requirement:

**3 MW cooling test package
& 2 x 1250 kVA**

Switching to **HVO**:

- Up to 90% reduction in CO₂
- Reduces NOx & PM by 15-25%

Switching to a **hybrid** and **right sizing** the generator to **300 kVA Stage V** (which is powering the boiler) can deliver:

- 55% reduction in generator fuel consumption
- A further 55% reduction in generator local emissions
- A further 55% reduction in CO₂
- Significantly reduced dBA when running off battery

6

Temporary Moisture Control

(Heating & drying for restoration, renovation or new builds)

💧 Temporary requirement:

**18 kW (6 x 3 kW) heating &
11 kW (9 x 1.2 kW) drying &
125 kVA generator**

Switching to **HVO**:

- Up to 90% reduction in CO₂
- Reduces NOx & PM by 15-25%

Switching to a **hybrid** and **right sizing** the generator to **60 kVA Stage V** (which is powering heaters and dehumidifiers) can deliver:

- 65% reduction in generator fuel consumption
- A further 65% reduction in generator local emissions
- A further 65% reduction in CO₂
- Significantly reduced dBA when running off battery

7

Heating for Commissioning of Chillers/Cooling Towers

🔥 Heating requirement:

2.5 MW heating test package (5 x 500 kW boilers & 500 kVA generator)

Switching to **HVO**:

- **Up to 90% reduction in CO₂**
- **Reduces NOx & PM by 15-25%**

Switching to a **hybrid** and **right sizing** the generator to **300 kVA Stage V** (which is powering the boiler) can deliver:

- 45% reduction in generator fuel consumption
- A further 45% reduction in generator local emissions
- A further 45% reduction in CO₂
- Significantly reduced dBA when running off battery

7

Temporary Steam Boiler

(OEM delays, maintenance and breakdowns)

🔥 Temporary requirement:

5 tonne steam boiler

Switching to **HVO**:

- **Up to 90% reduction in CO₂**
- **Reduces NOx & PM by 15-25%**

Switching to **gas** can deliver:

- Significant saving on your fuel cost
- Reduces PM by 100%

8

Pump / Motor Starts

(Dewatering site, submersible pumps)

⚡ Power requirement: **125 kVA**

Switching to **HVO**:

- **Up to 90% reduction in CO₂**
- **Reduces NOx & PM by 15-25%**

Switching to **hybrid** and a **60 kVA Stage V generator** can deliver:

- 75% reduction in fuel consumption
- A further 75% reduction in local emissions
- A further 75% reduction in CO₂
- Significantly reduced dBA when running off battery

Temporary Cooling

9

(Comfort cooling, concrete pouring, OEM delays, maintenance and breakdowns)

❄️ **Cooling requirement:**

800 kVA chiller

500 kVA generator

Switching to **HVO**:

- **Up to 90% reduction in CO₂**
- **Reduces NOx & PM by 15-25%**

Switching to **hybrid** and **right sizing** the generator to **300 kVA Stage V** (which is powering the chiller) can deliver:

- 55% reduction in generator fuel consumption
- A further 55% reduction in generator emissions
- A further 55% reduction in CO₂
- Significantly reduced dBA when running off battery

Site Set-Up

10

(Cabins/welfare etc)

⚡ **Power requirement: 350 kVA**

Switching to **HVO**:

- **Up to 90% reduction in CO₂**
- **Reduces NOx & PM by 15-25%**

Switching to a **hybrid** and a **load on demand package** of **3 x 100 kVA Stage V generators** can deliver:

- 55% reduction in fuel consumption
- A further 55% reduction in local emissions
- A further 55% reduction in CO₂
- Significantly reduced dBA when running off battery

General Site Power

11

(Lighting / small tools / CCTV etc)

⚡ **Power requirement: 200 kVA**

Switching to **HVO**:

- **90% reduction in CO₂**
- **Reduces NOx & PM by 15-25%**

Switching to a **hybrid** and a **load on demand package** of **2 x 60 kVA Stage V generators** can deliver:

- 50% reduction in fuel consumption
- A further 50% reduction in local emissions
- A further 50% reduction in CO₂
- Significantly reduced dBA when running off battery

Aggreko's Greener Approach

Aggreko has been improving its technology and services so those working on city centre construction projects are able to begin the transition to a greener future today. Some of these solutions are practical ways to increase energy efficiency and performance, while others represent more permanent ways of lowering impact on the environment.



Aggreko's Greener Approach

Right Sizing

Why would a generator be oversized?

There could be a number of reasons, including: to cope with motor starts, pump starts, and in general start-up currents; when the actual load or start-up is not known; or because a safety net or error tolerance has been added to cope for any unknowns.

Why would a temperature control solution be oversized?

This is mainly due to design parameters which are normally linked to the maximum ambient temperature fluctuations in each country. Or, it could be when the actual kilowatts of cooling / heating required are unknown, so a safety net or error tolerance is added to account for this.

What does this mean?

Hired equipment is quite often running at less than 30% load which means it is being inefficient. However if we design solutions where the equipment is running at 80% load or above regularly then we can offer significant savings in fuel, carbon and local emissions.

How does Aggreko right size?

Aggreko uses flywheel technology to help cope with start-up currents, **load on demand** to deal with variable loads, and the right **battery hybrid technology** that can cope with start-up currents and minimise the runtime of the generator. In larger packages batteries can also be utilised in spinning reserve to minimise run hours and offer fuel, carbon and local emissions savings. Aggreko's entire fleet incorporates smart metering enabling consultation on sizing requirements. Utilising telemetry capability can refine capacity to give optimum performance.



Aggreko's consultative approach may mean a package is different to what customers first request, but correct sizing will ultimately deliver the best results for the environment and the bottom line.



Aggreko's Greener Approach

Right Sizing



Load on demand

Load on demand power solutions replace a large, constantly operating generator with a group of smaller generators that can power up or down automatically according to demand onsite. For instance, if a site requires a total peak output of 1500 kVA, it is possible to use three smaller 500 kVA generators together to achieve this output when the site is operating at full capacity. When the demand for power fluctuates and this reduces to lower than 500 kVA, two of the generators can power down when not required.

By having two generators powering down, construction sites employing load on demand power systems can save money on the fuel that is no longer wasted through a large generator constantly operating at full capacity. On top of this, reducing the number of generators in operation during periods of downtime means harmful emissions are reduced as well as noise pollution.



www.youtube.com/watch?v=yxb92f2hWh4



Aggreko's Greener Approach

Right Sizing

Chemical or Mechanical?

Generator sets are typically sized for peak loads, however, most of the time they run at low load factors. As such, this results in poor fuel economy and high emissions.

There are two options to improve the efficiency when facing high start up or peak loads; a mechanical solution and a chemical solution. Each option has different benefits, and offer more efficiency when powering a tower crane.



Mechanical

Connecting **flywheel technology** to a smaller generator set levels the peak loads that the generator has to deal with. The flywheel system delivers high power energy during an increasing load step, capturing excess energy during a decreasing load step.

Chemical

This solution sees a **smart battery hybrid solution** connect to a smaller generator. Similar to the mechanical solution, the battery output will combine with the generator output to cope with the peak loads. The hybrid will then switch off, leaving the generator running at a more efficient load (circa 80%).

There is a significant difference between the two solutions. With the smart battery hybrid solution, it can manage the power output entirely. As it can run solely on the battery at very low loads, it allows users to gain extra efficiency, as the generator is switched off completely. This provides additional fuel, carbon and local emissions savings.

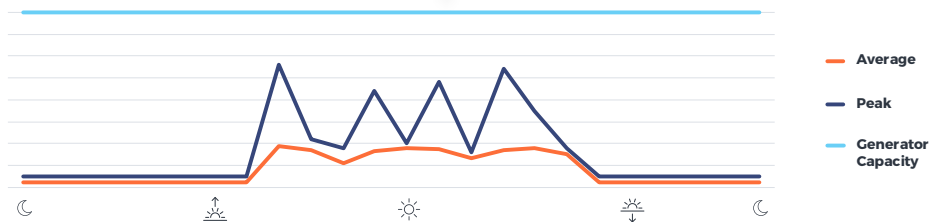
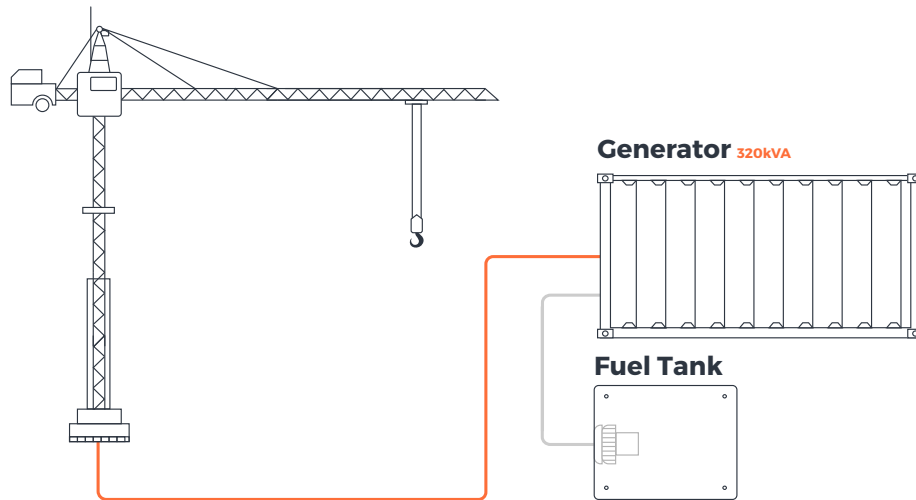




Aggreko's Greener Approach

Right Sizing

ROUTE 1: 320kVA GENERATOR



There are three different routes to power a tower crane. The graphic adjacent show the impact of powering a tower crane with a standalone 320kVA generator, integrating with flywheel technology, as well as using battery hybrid technology.

Route 1: 320kVA generator

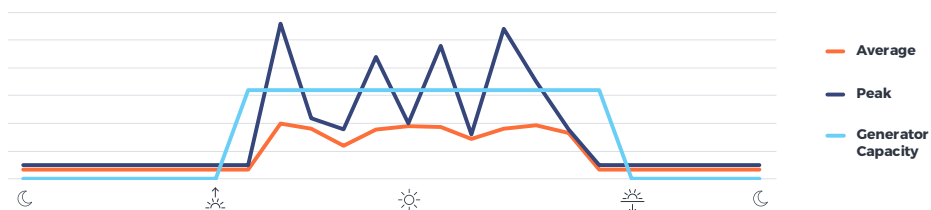
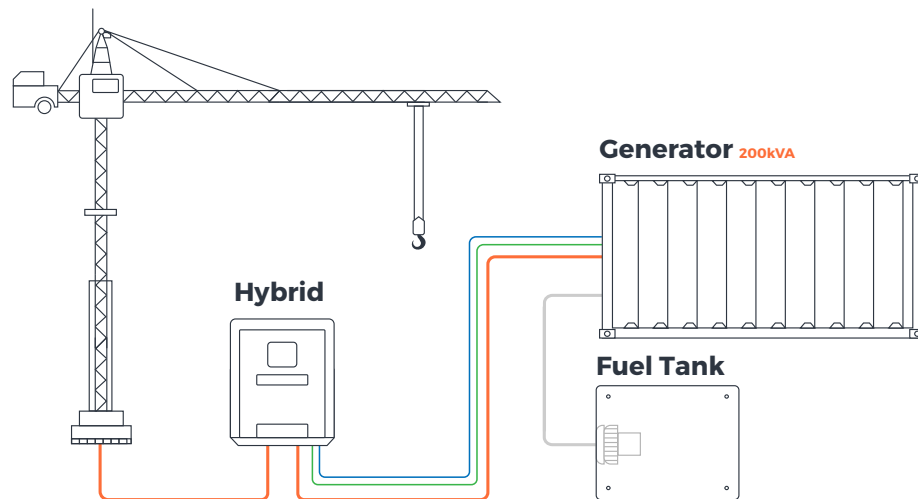
- Would typically work on average between 10-50% on a fluctuating load
- Likely to run on 24/7 basis to keep safety equipment running
- Generator likely idle at less than 5% load during night time
- Very inefficient fuel consumption



Aggreko's Greener Approach

Right Sizing

ROUTE 2: 200kVA GENERATOR AND BATTERY HYBRID



There are three different routes to power a tower crane. The graphic adjacent show the impact of powering a tower crane with a standalone 320kVA generator, integrating with flywheel technology, as well as using battery hybrid technology.

Route 2: 200kVA generator and battery hybrid

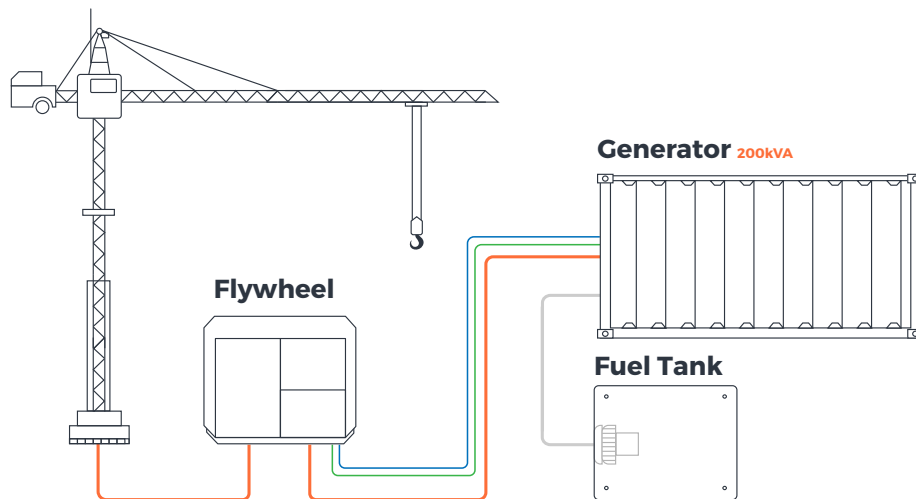
- Battery hybrid technology results in efficient energy management
- Generator can switch off during periods of low load
- Facilitates right sizing through power assist mode
- Reduction of up to 65% in fuel usage and local emissions
- Reduces noise pollution



Aggreko's Greener Approach

Right Sizing

ROUTE 3: 200kVA GENERATOR AND FLYWHEEL



There are three different routes to power a tower crane. The graphic adjacent show the impact of powering a tower crane with a standalone 320kVA generator, integrating with flywheel technology, as well as using battery hybrid technology.

Route 3: 200kVA generator and flywheel

- Enables a downsized generator for each application
- Smooth, consistent and controlled generator loading
- Facilitates right sizing and engine operating efficiency improvements
- Reduction of up to 45% in fuel usage and local emissions



Aggreko's Greener Approach

Greener Technologies

Hybrid

Aggreko's range of hybrid packages are ideal for keeping the power on at construction sites after hours. These models have a battery system paired with a generator, meaning fuel is only used when it's needed most. During non-peak hours or at night, the generator turns off and the battery system provides 12 hours of power at 4 KW – ideal for welfare structures, lights and security systems. They are also fully automated and require minimal maintenance.



ENVIRONMENTAL BENEFITS

- Can provide up to 75% in fuel savings
- Lower emissions
- Quiet function



Stage V

Aggreko's fleet of Stage V (60 - 1200 kW) generators work in the same way as the cleanest car engines, limiting carbon monoxide, nitrogen oxides and particulate matter to provide efficient power for use in ultra-low emissions zones. They are also fully compliant with European Commission's Medium Combustion Plant Directive.

Each Stage V generator will be accompanied by a DEF (diesel exhaust fluid) tank. The fluid will need to be regularly topped up.

ENVIRONMENTAL BENEFITS

- Diesel oxidation catalysts to reduce CO₂ emissions
- Diesel particulate filters to reduce local emissions significantly improving air quality
- Selective catalytic reduction systems to reduce NOx emissions



Aggreko's Greener Approach

Greener Technologies

Dehumidification

Humidity can wreak havoc with construction projects and many customers choose to tackle the problem using indirect heaters. However, this ineffective approach wastes fuel and causes needless emissions as it typically relies on generators using diesel to heat up air from outside. Once those generators turn off, the process needs to start again to reach the temperature specified on a thermostat. Dehumidifiers are much better suited to this task, especially when a recirculation process is included as this keeps air moving constantly without the need for extra heat.

Aggreko's cost-effective models are ideal for construction sites, being able to perform at low temperatures with airflow capacities up to 7000 m³/hr.

ENVIRONMENTAL BENEFITS

- Expert consultancy to reduce fuel consumption
- Efficient by design

When dehumidification is requested, Aggreko will also work with customers to determine what areas need drying out and reduce the space where possible to ensure the process is more efficient.

Solar

Aggreko's photovoltaic (PV) panels feature a single-axis tracking system to maximise energy production, while enabling a more stable and predictable yield curve. The PV panels can be mounted on frames and connected to cabin loads in the same connection in order to provide power to the cabins. They closely track the sun as it moves across the sky and this increases the amount of energy delivered by 10 to 20 percent without exceeding the maximum PV power penetration, saving more fuel without compromising system stability. Aggreko solar power is part of a hybrid system offering and integrates seamlessly with thermal and battery storage solutions.





Aggreko's Greener Approach

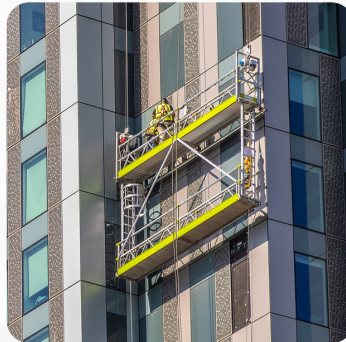
Greener Technologies

Cooling

Aggreko offers a range of solutions for projects in need of cooling, including cooling towers, heat exchangers and industrial air handlers. Its cooling engineers can help you work out what equipment you need and size it according to project, location and temperature requirements. Aggreko can also provide ducting and cabling, together with power generation, pumps and any other equipment needed to give you a complete, reliable cooling system.

ENVIRONMENTAL BENEFITS

- No CFC refrigerants
- Designed to minimise fuel consumption
- Capable of temperatures down to -40°C/F



istock.com/VictorHuang

Heating

Aggreko has a range of industrial heaters that are designed for challenging environments. Whether it's for welfare structures or ground thawing and concrete thawing, Aggreko has the best equipment for the job. The range includes electric models that are fume, flame and moisture free, as well as heat exchangers and indirect fired heaters for larger spaces. All packages are supported by experienced heating engineers.



istock.com/jikercelik

ENVIRONMENTAL BENEFITS

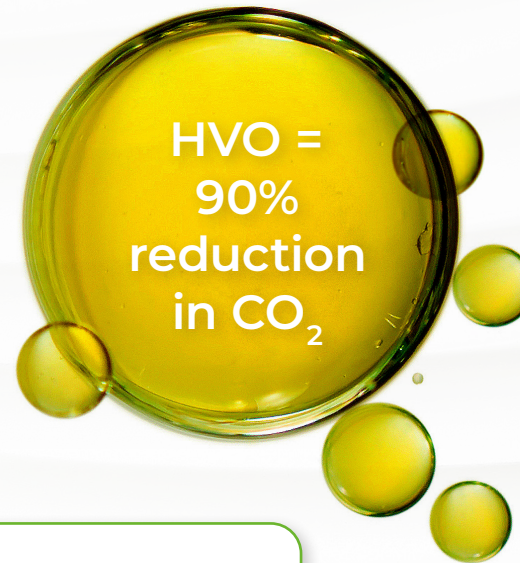
- High-quality fuel filtering
- Reliable, efficient and cost effective



Aggreko's Greener Approach

Alternative Fuels

Aggreko is committed to exploring the potential of alternative fuels, like HVO (Hydrotreated Vegetable Oil). The company has already developed a range of generators that are able to use biofuel as a 'drop in', therefore lowering the amount of fossil fuels needed to run equipment.



Scientific studies and field trials have shown that the use of HVO fuel brings the following additional emissions benefits compared to fossil diesel:

- Up to 33% lower levels of fine particulates
- Up to 30% less hydrocarbons (HC)
- Up to 24% lower carbon monoxide (CO) emissions
- Up to 9% less nitrogen oxides (NOx)
- Reduced levels of polycyclic aromatic hydrocarbons (PAH)



<https://www.aggreko.com/en-gb/hvo-hydrotreated-vegetable-oil-fuel>



Aggreko's Greener Approach

Services



istock.com/gorodenkoff

Aggreko's Remote Monitoring Service monitors the health of its fleet from a central operation centre and remotely adjusts to ensure maximum efficiency to reduce emissions.

Aggreko's team of engineers are able to remotely access generator data through our remote monitoring centre (ARM) to ensure there are no functionality issues, like an electrical trip or mechanical fault, and can analyse performance to ensure equipment is always running at peak efficiency. This service can also include fuel management, calculating what is needed based on usage and scheduling deliveries to match. These capabilities are especially useful for transport and infrastructure projects where equipment is running round the clock and there's little room to store extra fuel. Only keeping to hand what's being used also eliminates the risk of costly spillages that can delay projects and send costs spiralling.

Issues are rare but problems can always occur in construction environments. Aggreko has developed the ARM mobile app to counter this threat. This online portal gives users remote access to equipment status reports, listing thousands of critical equipment parameters. Metrics include load capacity, amps, run hours, fuel levels and GPS location.

Should an issue arise, users will also be notified of any critical performance alarms and contacted immediately by Aggreko's 24/7 Remote Operations Centre. A response team staffed by expert technicians will then diagnose, respond and remotely fix issues when possible.

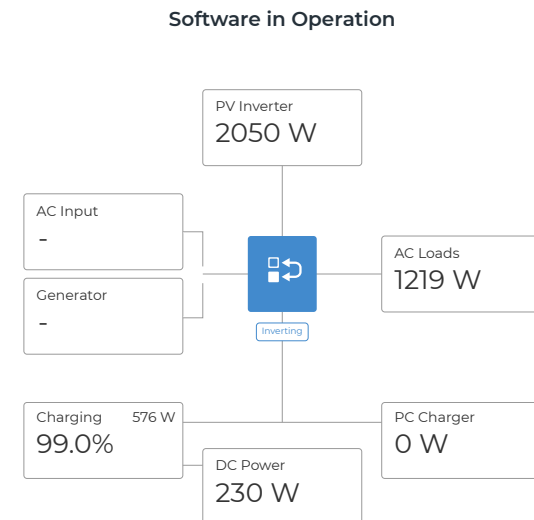
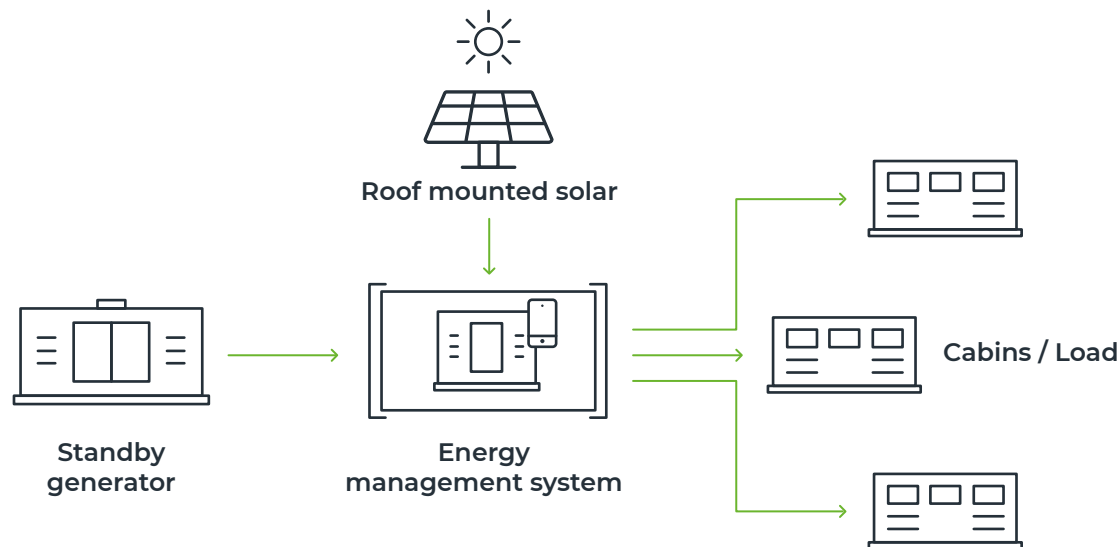


https://www.aggreko.com/-/media/aggreko/files/pdf/uk-pdfs/agk_1050_pg_b_arm-remote-monitoring_brochure_a4_2020_v4.pdf



Aggreko's Greener Approach

An Integrated Approach



Having the correct battery technology paired with the correct generator is only part of the solution. To deliver maximum results you need the correct software and controls to manage communication between technologies (generator, battery, solar and wind). This simple diagram shows a solar PV solution integrated into a hybrid system, enabling control when the battery is discharging and charging. Ultimately, an intelligent system like this will maximise the benefits of adopting renewable technologies by minimising thermal power in order to reduce fuel burn, carbon and local emissions.



Aggreko's Greener Approach

Future Technologies

With the world facing an estimated power gap of 100 GW by the end of this decade, quick, scalable power and energy storage will be crucial for industry and communities across the world. That's why Aggreko is continually innovating to meet the future with confidence – supplying sustainable power on demand, wherever it's needed through investment in its people, products, fuels and services.

Aggreko is working on new, low-carbon products at its manufacturing and technology facility in Dumbarton, Scotland. This includes products running on alternative fuels, like FAME (Fatty Acid Methyl Esters) and HVO (Hydrotreated Vegetable Oil) that are abundant and much cleaner than diesel. The company has also earmarked significant investment into hydrogen-ready engines and fuel cells that will allow for rapid roll-out as soon as the technology becomes available at scale. It is also trialling methanol engines at its manufacturing sites.

These changes represent the smaller steps needed today to meet bigger targets in the future. The business will continue its decarbonisation programme, eventually moving away from fossil fuels to offer a low- or zero-carbon range of power solutions.



Conclusion

The success of city construction now depends on the adoption of cleaner, more efficient technologies.

While the sector is key to economic growth, it also accounts for a high percentage of consumption-based carbon emissions and levels of dust, NOx and particulate matter found in urban air. Without changes, organisations will find it harder to complete projects as climate targets become stricter and clean air zones grow larger.

That said, businesses have already made positive steps and the industry recognises the need for action. Hired equipment offers an ideal route to a more sustainable future, helping to lower construction's environmental impact while also providing guaranteed, scalable power and temperature control.

For more information about Aggreko's product and services, visit:

[AGGREKO.COM](https://aggreko.com)



For more information:



03458 247 365



aggreko.com