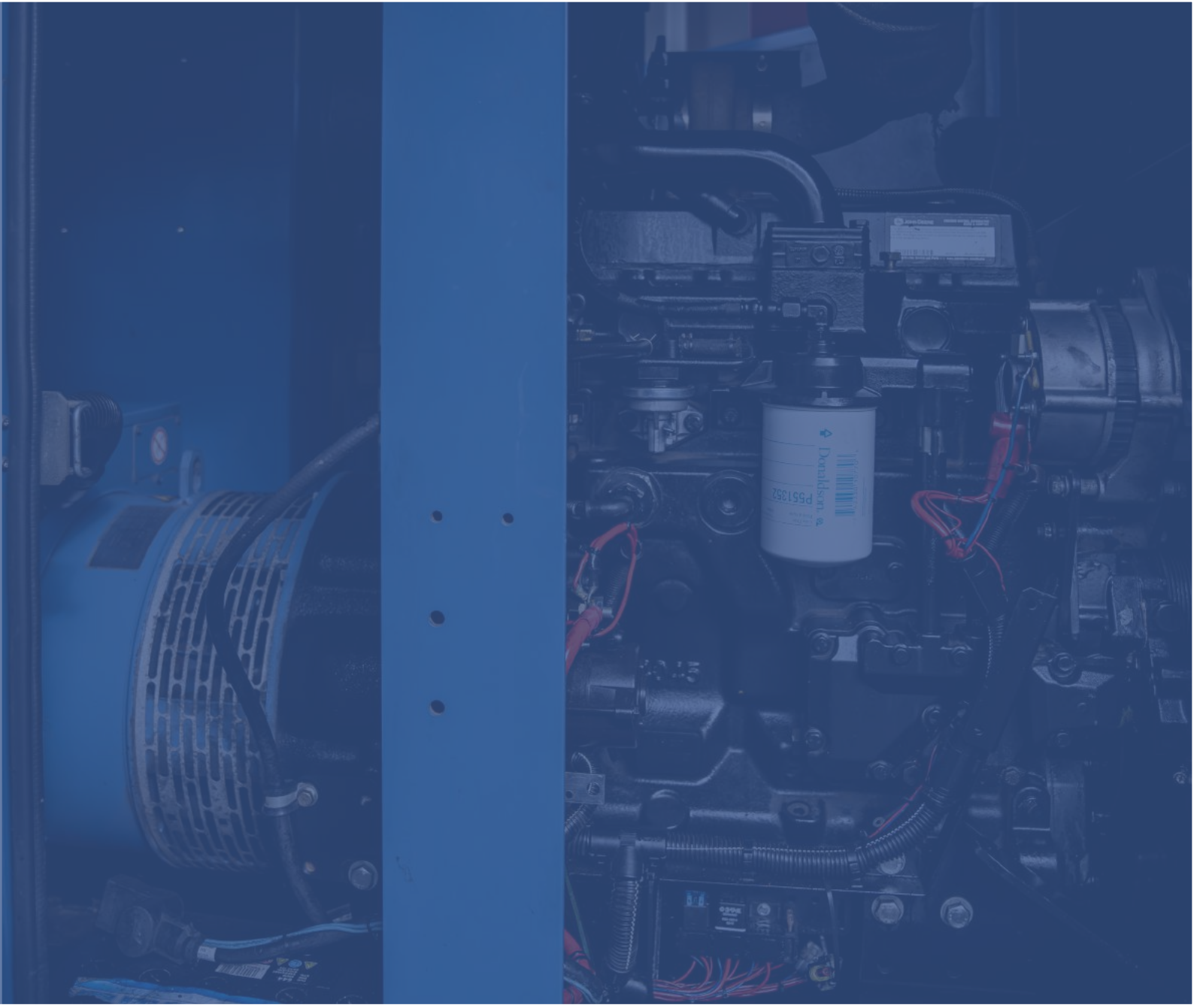

CREATING SUSTAINABILITY WHEN GENERATING POWER

Geoff Halliday, WB Power Services Ltd
March 2023

WBPS
POWER YOU CAN TRUST

CREATING SUSTAINIBILITY WHEN GENERATING POWER

1.0 Introduction

This article seeks to focus on how "greening" of existing standby diesel generators can be achieved and what options could be available as technology develops in the future. The author, Geoff Halliday from WB Power Services considers how a cohesive strategy is required if a business is to be successful in reducing emissions from its existing infrastructure. He examines why a sustainability strategy must have equal importance with other business imperatives and how collaboration between all elements that are involved is critical.

2.0 Reducing emissions from new and existing infrastructure

One effective way to start reducing emissions is through the introduction of a catalytic converter into the diesel generator exhaust gas stream. This can lesson CO2 emissions by between 20% and 40% (dependant of the unit fitted), with the converter reaching its optimal operating temperature before it is effective. The increase in the availability of Hydrotreated Vegetable Oil (HVO) in the last two or three years has resulted in many of the larger engine manufacturers approving its use across several engine ranges. Some manufacturers are even opening this to engines on more recently installed generating sets too (checks need to be made with the engine manufacturer for suitability). In addition to ensuring that HVO is readily available locally to ensure security supply, it is also worth noting that some manufacturers are offering solutions that will reduce running of generating sets for regular maintenance and testing.

Whilst there is a significant push to reduce CO2, any strategy should give due consideration to other pollutant sources. As well as the engine itself, exhaust gas after treatment systems are used to reduce other emissions such as NOx, PM, HC many of which can be retro fitted to existing installations. These include:

- Selective Catalytic Reduction (SCR)
- Oxidation catalysts
- Diesel Particulate filters

Catalytic converter

Particulate filter

3.0 Current and potential future standby power options

We now need to turn our attention to any existing solutions, and those that can be built into new infrastructure which are in the early stages of development. In support of this, we should also consider any limiting factors. These include:

- Battery storage system such as Lithium – Ion. These are available today and being trialled on the grid, data centres and other large-scale projects
- Other more compact and efficient battery / chemical storage types under development
- Mechanical Energy storage systems such as compressed air storage
- Fuel Cells. These have been around for many years and we continue to see improvements in performance. They have a lower footprint compared to batteries, and the possibility of quick refuelling with pressurized or liquid H2. These factors mean fuel cells could be adapted for backup applications and more extended storage periods
- Several engine manufactures / generating set manufacturers are working on a new range of engines that can run on hydrogen. Development is underway but it maybe a few more years before these products are widely available

Clearly there are several pros and cons associated with the potential current and the future use of these products, including the environmental impact in production and the operational constraints, such as:

- The availability of hydrogen
- Storage of hydrogen. It would currently require over 50 tonnes of hydrogen to support an all-electric major teaching hospital for 48 hours
- The global availability of Lithium and the environmental impact of its production

4.0 Sourcing current and future fuels

HVO and hydrogen are a current and potential future fuel to power standby generation. We now look at the care that needs to be taken in the selection and sourcing of these alternative fuels.

4.1 HVO

HVO is a liquid fuel that is synthesized from waste vegetable oils or animal fats using a special hydrotreatment process. Unlike first-generation biodiesels, HVO is an entirely renewable energy source that does not impact crop resources, and it can translate into up to 90 percent fewer greenhouse gas emissions over its entire lifecycle. Some HVO however is manufactured either as an entirely “new” product or a mix of products.

Such products use newly harvested oils such as sunflower or palm oils which in turn remove these from the food chain. In the case of palm oil, production is known to be responsible for widespread deforestation.

4.2 Hydrogen

Fuel cells or hydrogen fuel combustion engines can only really be considered 'green' if the hydrogen used to power them comes from sustainable sources such as renewables, nuclear, or biomass. At present, though, around 95 percent of hydrogen comes from natural gas – and making 1kg of this 'grey' H2 emits 11 tons of CO2. 'Blue' hydrogen is produced the same way, but the CO2 is captured and stored – but suitable storage sites are few and far between, so availability is limited. The long-term solution comes with "green" H2 made from renewable energy such as solar. This approach is a few years away from being practically available at scale, and the H2 produced is hard to store in bulk without significant investment in associated infrastructure.

Author
G R Halliday
Business Consultant
WB Power Services Ltd

Biography

Geoff Halliday started his career as an apprentice working for Square D (later part of Schneider) before moving into the critical power sector where he has now worked for over 40 years, splitting that time equally between both the UPS and standby diesel generation sectors.

During this period Geoff has held several roles ranging from Customer Service Engineer, Project Manager, Technical Director, Sales Director through to Managing Director.

The Critical Power market exposes the individual to a wide and diverse range of market sectors ranging Health Care, Life Science, Water Treatment, Banking and Finance, Military, Manufacturing, Process Control through to Data Centres of all sizes. Drawing on his management skills, product knowledge and vast application experience amassed throughout his career Geoff now enjoys sharing his knowledge with others.