



The Network Building
95-100 Tottenham Court Road, London, W1T 4TP

Planning Condition 29 - Consideration of alternative sources for Life Safety supplies

Minimising pollutants and impacts on the surrounding environment during the building's operation is paramount during the project design stages. Consideration has been given to alternative sources for Life Safety supplies through the design development period, with the relevant power source options noted within the below narrative.

1.0 Standby Generator

Standby generator sets have historically been the most robust and resilient approach to providing the secondary power source. The generators are only operated during test procedures (monthly – duration 5-10 mins, yearly - full load test) and in the event of a full primary HV/LV power failure.

The low run times limit the quantity of potential pollutants that are released, and should life safety systems be required due to a building incident then the safety of evacuating persons and emergency services becomes the main priority.

Whilst BS: 9999 deals with overall fire compliance, we refer to BS: 8519 & BS: 7671 for specific electrical guidance. BS: 8519 (6.1) states that 'the alternative supply should preferably be an automatic starting generator'. BS: 7671 (560.6) does provide detail on the selection of alternative systems, the details of which are below:

The proposed generator make and model is HVO fuel enabled, which represents a significant reduction in embodied carbon compared with traditional diesel fuel.

Additionally, the proposed Stage 4a design (refer to the below electrical services specification extract) has incorporated the following measures to ensure alignment with the requirement to minimise pollutant emissions:

- NOx limit below the 2000mg NOx for life safety loads; and
- Catalytic convertor.

VOL 2: Systems & Quality

0903 Electrical design and build

Item	Requirement
Emergency power generator	- 400kVA standby rating with a NOX limit below the 2000mg NOX for life safety loads and 20% spare capacity.
Generator Exhaust	- 300mm dia flue routed through dedicated riser to roof exhaust location. Including catalytic convertor to meet planning conditions.

The proposed generator make and model is HVO fuel enabled, which represents a significant reduction in embodied carbon compared with traditional diesel fuel.

Below is a statement from the supplier detailing the benefits of HVO fuel:



HVO – Advantages and Dis-Advantages

Prepared by **James Murphy – Bells Power Solutions – 27th May 2022**

HVO is renewable, biodegradable (by 51 days) and is made from 100% renewable raw materials. It is a drop in, direct replacement for diesel and can be used in FG Wilson/Perkins diesel engines. It is a low emission fossil-free diesel alternative that significantly **reduces NOx levels up to 30% (also reducing adblue intake), reduces CO2e levels up to 90%, PM levels by 86% helping to improve local air quality.**

The additive added to the HVO contains no metals unlike many other additives and it is 100% organic. There's no need to modify existing infrastructure as it Meets EN 15940 specifications standard for paraffinic fuels (**therefore OEM approved!**)

Some of the advantages of using HVO fuel over White Diesel are

- Renewable – made from 100% renewable raw materials
- Biodegradable by 51 days – also less risks and cost if spilt.
- Odourless
- CO2e, NOx and PM levels are reduced up to (90%, 30%, 86%)
- All OEM approvals – Conforms to EN15940 – so direct replacement
- Direct drop-in replacement for diesel (on road/ off road)
- FAME FREE less of a service cost
- Does not go off.
- Has excellent cold weather performance – can perform -42 °C
- Adblue reduction (up to 20%)
- Every litre you change from diesel to Green D is equivalent of 2.8kg of CO2e saving
- Improves air quality

As HVO is FAME (Fatty Acid Methyl Esters) free unlike Diesel (Biofuel content), therefore there are no microorganism present within the fuel that leads to bacteria growth and eventual contamination of the fuel if left untreated over the course of 6-10 months. In Diesel systems we use a fuel polisher to service the fuel regularly to clean and prevent the build-up of these contamination which if untreated could cause the engine to seize due to block filters etc. By using HVO type fuel you negate the need to service the fuel as it will not contaminate and therefore the requirement for a fuel polisher in the system is omitted.

Presently there are no real disadvantages to using HVO over Diesel other than the fuel having a higher price per litre point over diesel and outside of Greater London area the coverage for bulk delivery of fuel cannot always be covered.

Fuel deliveries can be made in full artic loads of up to 38,000 litres and can be delivered to site within 1-2 days of order.



2.0 Alternative HV supply

Dual independent HV incoming supplies should not be considered an acceptable alternative method unless they comply with BS: 9999 (37.2.3.3). The criteria for a separate HV supply is dependent on the available local UKPN infrastructure.

The second supply must be from a separate HV network, with written confirmation from UKPN that the two supplies 'are unlikely to fail concurrently'.

Discussions have been held with UKPN to understand the availability of the alternative source in the area and it is confirmed that the supply is unavailable. To provide the alternative HV supply would involve extensive disruptive works to the local area as considerable excavations would be required.

UKPN will also on occasion need to undertake network maintenance which may affect the supply integrity of the building. Whilst maintenance activities are necessary for all alternative supplies, these are generally co-ordinated by the building management team to ensure that it is carried out during unoccupied periods.

During the design consultation period the project team have been unable to obtain a proposal from UKPN for the secondary supply. The statement is often only available to buildings of strategic importance (refer to Appendix A)

3.0 Uninterruptable Power Supplies (UPS)

Batteries/UPS systems are not excluded as a means of supplying a life safety supply, but they do have a number of associated constraints.

UPS are generally sized for low intensity loads (IT equipment) generally for a 30 min duration, the Life Safety requirement is 8 hours. The number of batteries needed for Life Safety is prohibitive and would require a separate battery room (with 120 min fire compartment, gas suppression, cooling, etc.). The cooling and suppression systems required by the storage batteries would also be supported by the same batteries with no resilience.

Most of the Life Safety loads are 'inductive' with high start-up currents (and locked rotor condition to be considered). To deal with the initial inrush/load peak, a Rotary UPS (which run on Diesel) should be considered in addition to a static battery version.

UPS systems often rely on the primary supply to be healthy to clear faults (tripping of the MCBs) as they are unable to generate sufficient fault current themselves. This constitutes a life safety risk itself should a fault occur when being used during a mains failure (and is not in accordance with BS: 7671 560.6.8.2)

The recharge time of batteries is generally 80% within 12hours/100% within 24 hrs. This leaves the building unprotected for these periods and therefore not able to be occupied.

Fire Fighting lifts are often not accepted when supported by UPS/battery supplies. If there is any regenerative braking this can cause issues with the UPS

The incorporation of batteries/UPS systems does not align with the sustainability aspirations of the development. Due to the requirement for the batteries/UPS system to be dedicated for fire and life safety systems, the disadvantages listed below are not able to be offset with the benefits that are typically available to electrical storage systems e.g., optimised renewable energy use, load-shedding, or deferral. The disadvantages include:

- The development's operational energy aspirations will be impacted due to:
 - The increased cooling load of the development to serve the UPS room/enclosure.
 - The parasitic load of the batteries due to the requirement for 24/7 trickle charge.
- The reduction in battery capacity over the design lifetime of the battery/UPS system results in the requirement to oversize the system, hence the need for larger equivalent systems to that of a diesel generator as any reduction in fire and life safety performance is unacceptable.
- The embodied energy associated with the ancillary support systems i.e. cooling systems (especially due to the likelihood of requiring additional refrigerant based systems), construction of fire rated enclosures, fire protection systems including gas suppression protection and detection.
- The economic design life of a battery/UPS system varies greatly between 5-12 years, resulting in increased frequency of replacement works and associated carbon impacts of the operations.

4.0 Conclusion

The secondary UKPN supply, even if suitable infrastructure is available, is dependent on the primary and secondary supply not failing concurrently. This is not a statement that UKPN generally are able to release, as there are a large number of potential failure points within their systems.

UPS/Battery systems are also not generally selected as, again, there are a number of failure points that need to operate in the event of an incident. Whilst the systems are regularly tested there is still an increased risk. In addition to the operating risks there is a finite operation period that the batteries are able to support, with a lengthy recharge period following operation.

Based on the quantity of complex requirements and operational limitations with alternative systems, the provision of a standby generator system has been deemed the optimal & most resilient means of providing a secondary supply for The Network Buildings Life Safety systems.

We recommend that the Generator is accepted for incorporation into the scheme as this is the most effective and reliable means of ensuring the safety of all building occupiers and attending emergency services personnel in the event of a major building incident.

Appendix A – UKPN Fire

From: "Howe, Michael" <michael.howe@ukpowernetworks.co.uk>

Date: 5 September 2023 at 13:16:21 BST

To: Jo Benson <Jo.Benson@derwentlondon.com>, Donald Findlater <donald@blackburnltd.com>

Subject: Secondary supplies.

Good afternoon

In respect of your questions relation to a secondary supply prior to a formal application the following two points should be considered:

1. We do allow more than one supply in a building for purposes of providing the load, these are generally only for buildings of strategic importance such as data centres or hospitals you're likely to encounter significant local disruption with lengthy cable runs to secure, and of course assuming the criteria can be met for it's safe operation.
2. If this supply would not be for load purposes and would be used instead of a back up generator (which would not be in use to support a portion of the building load under normal conditions).

If that is to be the case then it's a firefighting supplies, and we currently do not install those as we can't comply with BS9991. (details on this can be found in the G81 Document library.)

I hope this helps.

Regards

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Dates for your diary | Connections Customer Workshop

26th September 2023 Connections Customer Forum.