Fire Risk Statement

Contullich BESS

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Revision History

Issue	Date	Name	Latest changes
01	20/12/2023	William Miskelly	First Created
02	01/05/2024	V Morgan	Fire response strategy in line with current guidance
03	30/05/2024	William Miskelly	Access for emergency services section updated to reflect additional access.

Contents

1 Introduction

This document forms the Contullich BESS fire risk statement. The document indicates how Contullich BESS project has been developed to address fire risk in several ways. It contains key mitigation measures against the risk of fire ignition and propagation within the battery energy storage system (BESS) site.

Battery technology and associated understanding of fire risk is continually evolving within the industry. As such, this document sets out key principles and mitigation measures based on the current understanding of battery fire risk but does not include a detailed Fire Risk Management Plan. A detailed Fire Risk Management Plan would be developed during detailed design, following battery selection.

2 Project Description

2.1 General project information

Renewable Energy Systems Ltd (RES) is developing an energy storage facility which will consist of battery storage enclosures (BSEs), associated foundations, transformers, power conversion systems (PCSs), electrical infrastructure, access track, crane hardstanding, and spares storage containers.

2.1.1 Battery selection

The proposed battery technology for the development is anticipated to be lithium iron phosphate (LFP). LFP has better stability against thermal runaway at higher temperatures compared to some other battery chemistries. This is supported by the UL 9540A test results of RES' preferred battery system which show that, at a unit level, following deliberate initiation of thermal runaway:

- No flaming outside the initiating battery rack was observed.
- Surface temperatures of modules within the target battery rack adjacent to the initiating battery rack do not exceed the temperature at which thermally initiated cell venting occurs.
- Wall surface temperature rise does not exceed 97°C above ambient.
- Explosion hazards were not observed during the test.

Data from UL9540A testing can also be used to inform detailed design of the site and safety systems.

Each battery unit has approximately capacity of 1.75MW / 3.7MWh and length of approximately 20ft. The battery form factor will be determined during detail design phase.

3 Design Factors

3.1 Fire Response Strategy

It is the intention that the site would be self-sufficient during a potential battery-based fire event and would not require fire service intervention to prevent fire spread or any other significant risks to people or property. Key principles of the NFCC Grid Scale Battery Energy Storage System planning – Guidance for FRS, 2023 ("the NFCC Guidance") are addressed through the mitigations identified within this report, as these pertain to the fire risk management strategy set out below.

The overarching fire risk management strategy would adopt the following controls:

1. Implement measures that result in a very low risk of fire ignition and any suitable environment for sustaining fire.
2. Implement measures that result in a very low risk of fire propagation and spread within a fire source (e.g. BSE).
3. Ensure fire spread between significant elements of the project is not expected, through application of design standards and use of calculations / modelling as necessary.
4. Include adequate provisions to allow the fire service to monitor a fire event, intervening only if there is a failure of the controls above.

Due to the risks associated with lithium-ion fires, transformer fires, and high-power equipment, there are significant safety benefits to minimising fire service intervention and consequential firefighter hazard exposure.

During detailed design, following battery product selection, a project specific Fire Risk Management Plan will be developed, in liaison with the Fire Service and with due consideration of the NFCC Guidance. This Fire Risk Management Plan will include:

- A fire risk appraisal that details how the fire response strategy above will be achieved, including the identification and design of any further mitigations required to achieve the strategy above.
- An emergency response plan.

3.2 Mitigation Measurements

The following points define all the preliminary design decisions that have been carried out to minimise the risk against fire ignition and propagation within the battery energy storage system (BESS) site.

3.2.1 Equipment spacing

The site has been developed to include adequate spacing between the battery storage enclosure (BSE) to mitigate against the risk of fire spread in the event of a fire within one BSE. The site layout aligns with applicable NFPA 855 spacing criteria as well as the spacing recommendations outlined in FM Global Property

Loss Prevention Datasheet 5-33 (Interim revision July 2023). The layout allows minimum distance of 3m between batteries enclosures and any other infrastructure.

3.2.2 Protection systems

Each BSE will have a dedicated fire protection system, comprising flammable gas detection and venting, fire detection and alarm, and an automatic fire suppression system. Additionally, key battery health and environment parameters will be continuously monitored with alarms sent to a control centre. Automatic electrical disconnection will be enacted by the Battery Management System should operational temperature, current or voltage limits be breached. There will be multiple levels of alarms prior to protection limits which warn the operator of proximity to safe operating limits.

3.2.3 Access to battery enclosure

All battery enclosures will be accessed via external doors only, i.e. no internal corridor to eliminate the risk of people being caught inside an enclosure during a fire or thermal runaway gas venting incident.

3.2.4 Location of BESS facility

The location of the facility has been selected considering the distances from existing nearby premises. There are no premises nearby site, with the nearest one to site to be in distance more than 200m. Battery storage enclosures are offset a minimum of 8m from the perimeter fence and the land immediately surrounding this is allocated to earthworks that will provide a further offset to any future fire risk receptors.

3.2.5 Access for emergency services

The fenced BESS compound has a wide access route allowing the fire service to access the site during an incident. In addition, two site access points have been proposed to ensure that fire services would have an alternative option for approaching site if the combination of wind direction and smoke made one direction particularly onerous.

Turning locations for emergency response vehicles are available within the site hardstandings.

The site compound and access track are not located in a flood zone, therefore, vehicular access to allow the emergency services to safely reach the development during design flood conditions can be achieved.

3.2.6 Water supply

No water supply is available on site and it is intended that an onsite water supply would not be required to achieve the fire response strategy outlined in 3.1. However, if agreed as necessary in development of the Fire Risk Management Plan, a supply of 1,900 litres per minute for at least 2 hours in line with the NFCC Guidance could be achieved through provision of a tank at an agreed location close to the BESS compound.

4 Conclusion

During the preliminary design, efforts have been made to mitigate, minimise, and prevent any fire hazard on site by incorporating specific design factors as described in this document. During detailed design and following battery product selection, a project specific fire risk appraisal will be used to detail how the fire risk strategy will be achieved, and an emergency response plan will be developed through liaison with the local fire service.