SHOREHAM GRID SCALE BATTERY ENERGY STORAGE SYSTEM FIRE RISK ASSESMENT

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SHOREHAM GRID SCALE BATTERY ENERGY STORAGE SYSTEM FIRE RISK ASSESMENT

1. Introduction

Risk assessments must consider potential emergency procedures and be used, in conjunction with prescribed legislative requirements such as the Dangerous Substances and Explosive Atmosphere Regulations, to determine the range and extent of emergency plans required. Emergency plans must be in place at each location and will be designed to assist people in responding quickly and efficiently should any serious incident occur. The risk assessment and plans will be used to determine the requirements for emergency drills and specific training.

The plans must include the full address of the site, contact numbers for key members of the management team and local emergency services, i.e. Fire, Ambulance, Doctor, Electricity and Gas Company, etc. The contact details and all relevant sections of the plans will be prominently displayed. All necessary emergency equipment will be provided, clearly identified and readily accessible. Appropriate first aid provision must be in place at all sites.

In addition to the local emergency plans, crisis management procedures will be developed and communicated across all sectors of the business, as appropriate, with any necessary training undertaken.

This risk assessment has been prepared by CEMEX UK in relation to a proposed Grid Scale BESS to be located at Shoreham port

The BESS location will be Cemex Brighton Concrete Plant and Wharf,

Brighton and Hove, Brighton

BN41 1DN

The are 7 full time operatives based at the site

2. BESS RISKS

2.1.1 This risk assessment has been prepared by CEMEX UK in relation to a proposed BESS to be located at Shoreham port

2.1.2 A BESS is an electrochemical system that stores energy and can discharge it as electrical energy when required. BESS implementation has significantly increased over the past decade, it enables utilities and system operators to meet various grid demands, contributing to grid stability and reliability. The benefits of the system will be improvements to operational resilience, sustainability and day to day energy supply to meet the vessel requirements.

2.1.3 The battery technology used in the BESS at Shoreham will be LFP, which is a lithium-based battery technology

2.1.4 The most severe failure mode associated with the BESS are thermal runaways which occur when stored chemical energy in lithium-ion cells converts to thermal energy potentially leading to fires or explosions, this risk assessment focuses on the identification of potential fire hazards and reduction of fire risks associated with the BESS, the overall aim of the assessment is to prevent a fire from occurring to reduce the chances of a thermal runaway event

2.1.5 The BESS at Shoreham will provide electrical power to the CEMEX Go Innovation whilst alongside at Shoreham waiting for the next high tide

2.1.6 The BESS will be A ‘Grid Scale’ system supported with a 2 Megawatt-Hour Battery Energy Storage System, housed inside a 20ft container, located in the South - Eastern corner of the wharf footprint.

2.1.7 HAZARDS AND CONTROL MEASURES

SHOREHAM BESS FIRE RISK ASSESMENT	
RISKS	MITIGATIONS
Risk of fire within BESS caused by overheating of lithium batteries	The design of the BESS Li-ion system includes: • Heating, Ventilation and Air-Conditioning System • Temperature monitors integrated into the battery management system • Automated shut down mechanism if temperatures get too high • BESS Containers sealed, automated fire suppression system in place to prevent fire spread • Battery management system to prevent overuse and maintain batteries in good condition • The BESS will contain an early warning system including visual and audio alarms to enable prompt emergency response reducing potential for fire to start
Fire within BESS caused by battery cells overheating could lead to potential 'thermal runaway' this may spread to additional battery cells leading to a 'cascading failure' and potential damage to surrounding structures or injuries to personal	The design of the BESS Li-ion system includes: • Dousing mechanism for emergency cooling and fire suppression, BESS is equipped with automatic Phosphate fire suppression system to limit fire propagation between modules. • The system also contains a manually activated sprinkler which can be deployed if the suppressant system does not completely extinguish the fire. • BESS container will be located in the S/W corner of the wharf away from nearby structures to reduce potential for fire spread
Manufacturing defects within lithium-ion batteries could lead to short circuits/malfunctions within the system increasing potential for thermal runaway and subsequent fire with potential for injury	• BESS system will be designed by ICONSYS in accordance with industry standards, • All electrical components will be tested, the BESS system will undergo factory assurance testing (FAT) and will be

	certified prior to site delivery (Cemex representative present during FAT)
Fire caused by improper installation of the BESS, may cause overloading of circuits leading to overheating and potential for thermal runaway	• BESS system will be installed on site by trained competent and authorised operators under direct CEMEX supervision
Potential Vehicular impact to the BESS caused by mobile plant operating within the wharf may result in mechanical damage to batteries causing overheating and potential fire	• BESS will be protected by concrete and Armco barriers to reduce potential for damage due to vehicle impact
Fire within BESS could result in fire propagation to surrounding structures within the wharf	• BESS container will be located in the S/W corner of the wharf footprint, situated away from additional structures, public rights of way and site boundary, the nearest structure is an office portacabin located approx. 20 meters away in the adjacent business (Days Aggregates) this assessment considers the chance for fire to spread to other structures as low, any fire is likely to be contained within the BESS
Fire within BESS could result in fire propagation to the CEMEX go innovation vessel when plugged into the BESS system whilst alongside at Shoreham	• BESS container will be located in the S/W corner of the wharf footprint, the CGI will not be in close proximity to the BESS whilst alongside reducing potential for fire to spread • The BESS will contain an early warning system including visual and audio alarms which will alert ship's crew to a potential fire enabling prompt emergency response • CGI will develop emergency management plans to enable an effective response to a fire within the BESS container
Smoke inhalation, potential for toxic fumes/gasses to be released during a fire within the BESS, the resulting smoke could affect neighbouring businesses or residential areas	• BMS, fire suppression systems installed, the nearest residential locations appear to be 180 metres to the west and 93 metres to the East of the site. This assessment considers the risk of adverse effects to neighbouring locations as low, however emergency response plans will be established and advised by the FRS to ensure any effected residents or members of the public are informed if required, the emergency plan will also consider the prevailing S/W winds in the locality and any nearby businesses

Explosion (deflagration event) within BESS container due to thermal runaway condition and build-up of gasses, potential injuries to surrounding personnel/buildings	• Battery management system installed to monitor battery cells and detect anomalies which could lead to a thermal runaway, the BMS system will shut down the system to reduce potential for fire to spread • Deflagration system will be installed within BESS container to relieve pressure from any potential explosion, directing the pressure and flames to a safe area, preventing the container from rupturing, reducing structural damage and potential injuries to personnel
Risk of fire propagation to BESS due to possible storage of combustible materials in vicinity of BESS,	• BESS will be located in the S/W corner of the wharf away from any additional structures, • BESS containers will be mounted on non-combustible surface, • Area around the BESS containers will be kept clear of any combustible materials and vegetation to prevent risk of fire
Temperature within BESS causing battery cells to overheat increasing risk of fire	• Air conditioning and cooling systems installed within BESS container to regulate ambient temperature to prevent batteries from overheating
Insufficient volumes of water to tackle a potential thermal runaway situation	• BESS system is located adjacent to river on the wharf which provides an unlimited water supply to enable FRS to tackle potential fire within BESS
Accumulation of dust within BESS container could lead to fire	• Filter system installed within BESS container to reduce dust accumulation

3 CONSULTATIONS

West Sussex Fire and Rescue Service have been consulted, CEMEX will collaborate with West Sussex (FRS) during the project to ensure relevant emergency response plans and firefighting recommendations are factored into the design of the system, West Sussex FRS have advised CEMEX to follow recommendations in the NFCC guidance document ‘Grid Scale Battery Energy Storage System planning – Guidance for FRS’

Cemex will engage with Shoreham Port Authority to ensure any potential risks to the port are mitigated, and emergency plans are communicated to all relevant stakeholders

3.1 RISK MANAGEMENT AND EMERGENCY RESPONSE PLANS

A comprehensive risk management plan will be developed by CEMEX which provides advice in relation to potential emergency response implications including:

- The hazards and risks at and to the facility and their proposed management.
- Any safety issues for firefighters responding to emergencies at the facility.
- Safe access to and within the facility for emergency vehicles and responders, including to key site infrastructure and fire protection systems.
- The adequacy of proposed fire detection and suppression systems (e.g., water supply) on-site.
- Natural and built infrastructure and on-site processes that may impact or delay effective emergency response.

3.2 EMERGENCY RESPONSE PLAN

CEMEX will develop a comprehensive Emergency Response Plan with consultation from West Sussex FRS to facilitate effective and safe emergency response to include:

- How the fire service will be alerted
- A facility description, including infrastructure details, operations, number of personnel, and operating hours.
- A site plan depicting key infrastructure: site access points and internal roads; firefighting facilities; drainage; and neighbouring properties

SUMMARY

- The BESS is designed with a BMS to reduce potential for an incident to occur
- The automated fire suppressant systems will reduce the severity of any fire within the BESS
- Cemex will develop emergency response plans with consultation from West Sussex FRS to ensure adequate provision of firefighting equipment
- The CEMEX go Innovation will develop emergency management plans to respond to a potential fire in the BESS container whilst alongside at Shoreham
- The location of the BESS will ensure potential fire propagation to surrounding structures is unlikely, any fire will be contained within the BESS container
- Early warning alarm systems will ensure prompt emergency response enabling consequences of any fire to be reduced
- The BESS container will not be occupied, the risk of personnel injury due to fire is low
- Due to the fire management systems the potential fire risk should be regarded as low
- The emergency response plans will greatly reduce the consequences if an incident was to occur

CONCLUSION

CEMEX is committed to developing a safe BESS that will provide long dependable operation. It is in everyone's interest that the selected BESS technology, is robust, in particular with regards to safe operation.
Based on the above risk assessment, the control measures designed into the system and with the forementioned emergency procedures in place, the potential fire risk of the BESS facility would be regarded as low

This assessment demonstrates that relevant stakeholders have been consulted and their responses will inform the design of the Scheme, and that safety will be inherent in the overall design of the system, minimising the risk of a fire event occurring, and reducing the impact of such an event should it occur.