

**Annex EF52** of Dr E J Fordham      Interested Party – Unique Reference: 20030698  
EN010106 – Sunnica Energy Farm

**Battery Energy Storage Facility, Doagh Road, Kells – Fire Risk Assessment  
Addendum**

Institution:    HSE(NI)

Date:            12 January 2023

Reference:    LA03/2022/0116/NMC

To:              Antrim and Newtownabbey Borough Council

Antrim and Newtownabbey  
Local Planning Office  
Mossley Mill  
Carnmoney Road North  
Newtownabbey  
BT36 5QA

12 January 2023

Dear Sir/Madam

**Planning Application Ref No:** LA03/2022/0116/NMC

**HSENI Ref No:** CN202211-0004

**Location:** Lands at Doagh Road Kells (to the north east of Kells Substation and to the south west of 3 Whappstown Road)

### **Background**

Newtownabbey Local Planning Office (hereafter referred to as the Council) consulted the Health and Safety Executive Northern Ireland (HSENI) regarding the Non-Material Change application, LA03/2022/0116/NMC.

The Council requested that HSENI comment on whether the change in the containers or their contents would result in a material change to the development previously approved.

### **Summary**

Based on the information available, the proposed changes increase the potential quantity of HF produced during a fire and the harmful effects of a toxic fire plume. This increase in risk is due to the increase in MW capacity per container and the associated increase in materials, such as an electrolyte.

The proposed changes in container dimensions do not increase the potential overpressure effects associated with an explosion.

The proposed changes in the layout of the containers alone do not increase the risk of a fire or explosion.

### **Clarifications**

HSENI is not the enforcement authority for the relevant planning regulations that define a material change. HSENI will confine its comments to the effect of the

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changes in the battery energy storage system (BESS) container regarding the risk of fire and explosion.

This response will be qualitative, as opposed to quantitative in form. It is not the responsibility of HSENI to do a detailed modelling analysis of the consequences of a worst-case scenario involving the proposed BESS containers.

It is the responsibility of the operator under the Management of Health and Safety at Work (Amendment) Regulations (Northern Ireland) 2006 to make a suitable and sufficient assessment of the risks to the health and safety of his employees and of persons who could be affected by the operator's activity.

For societal risk, a Quantitative Risk Assessment (QRA) can determine if the risk is as low as reasonably practicable (ALARP).

HSENI has noted correspondence from interested parties in this application quoting HSENI to support their argument(s). HSENI advises the Council, if considering quotes attributed to HSENI, to contact HSENI to ensure they are correctly quoted and not taken out of context.

### **HSENI's approach to responding**

When considering the application, HSENI has reviewed the following concerning the risks of fire or explosion:

1. The proposed change in the layout of the BESS containers.
2. The difference in BESS container dimensions.
3. Change in the internal components of the BESS container.

HSENI has not considered new processes or dangerous substances, as the application did not include them.

### **Proposed layout of the BESS containers**

HSENI has considered the change in the number of containers and the location of the containers.

The applications state the number of BESS containers has decreased from twenty-five to thirteen. As a BESS container has associated zones around it for the impact of a fire or explosion, lowering the number of containers reduces the overall area potentially impacted by a fire or explosion, if the risk from a container remains the same.

A change in the location of a BESS container can increase the risk of fire or explosion by:

1. Decreasing the distance between the source of the fire or explosion and the people impacted.
2. Decrease the distance between containers, increasing the likelihood of a domino event.

Documents PAO962006\_Site Layout and Block Plan\_002 indicate that the property at number three, Whappstown Road, is the closest dwelling to the development. Document PAO962006\_Miscellaneous\_005 states at P2.110A that the distance from the nearest BESS containers to number three, Whappstown Road, is increased from 44 meters to 46.6 meters.

The applicant has stated:

- The NMC layout BESS units are located slightly further away from the closest receptor.
- The NMC layout BESS units are further away from the closest site boundary
- There is an increased distance between BESS units in the NMC Layout.

HSENI concludes on the information provided that the proposed changes in layout alone do not increase the risk of a fire or explosion.

### **Proposed BESS container size**

The application proposes changing the container's external dimensions. The internal volume available to create an explosive atmosphere with electrolyte vapour determines the resulting explosive force.

The applicant stated that the battery compartment volume would decrease from 50.586 cubic meters to 48.882 cubic meters. Correspondence from the applicant reveals an internal steel wall separates the interior compartments and prevents the migration of explosive vapour.

Based on this information, the change in BESS container dimensions has not increased the potential overpressure from an explosion.

### **Change in contents of the BESS container**

The application states the total MW for the BESS development will remain at 50 despite the number of containers reducing from twenty-five to thirteen.

A fire involving a BESS container can generate a wide range of toxic combustion products, with the most significant in terms of toxicity being hydrogen fluoride (HF). The quantity of HF generated in a fire can be estimated using a mass of HF per MW formula. Based on this calculation, the increase in MW per container from 2.0 to 3.8 MW would approximately double the quantity of HF produced in a fire.

Combustion involving the components of batteries, such as the electrolyte, produces Hydrogen fluoride. Improvements in battery technology may allow the increase in MW capacity but maintain the quantity of hydrogen fluoride in a fire.

HSENI requested the applicant explain how the increase in MW per container from 2.0 to 3.8 MW is achieved to determine the impact on fire or explosion risks.

The applicant provided a Golder Technical Memorandum (reference: 170820-400/02) dated 14th December 2022. HSENI has compared this to the information provided by the Golder Technical Memorandum (reference: 170820-400/01) dated 22nd October 2020.

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Table one details materials associated with the batteries for the entire site and per container.

**Table 1**

Source	Golder Technical Memorandum	Golder Technical Memorandum	
Ref:	70820-400/01	170820-400/02	
Date:	22 October 2020	14-Dec-22	
Energy capacity (kWh)	263000		
Maximum power (MW)	50		
Number of containers	25	13	
<b>Material for site (tonnes)</b>			<b>Percentage increase</b>
Cobalt Oxide (CoO)	19.1	5.1	-73%
Manganese Dioxide	19.1	5.1	-73%
Nickel Oxide	19.1	40.7	113%
Carbon	38.1	40.7	7%
Electrolyte (proprietary)	28.6	40.7	42%
PVdF (Polyvinylidene fluoride or polyvinylidene difluoride)	9.5	10.2	7%
Aluminium foil	19.1	20.4	7%
Copper foil	17.2	40.7	137%
Mineral Oil	Not included	27.495	
Ethylene Glycol	Not included	0.239	
R134A	Not included	0.39	
Propane 1,2 diol	Not included	2.84	
<b>Material per container (tonnes)</b>			
Cobalt Oxide (CoO)	0.764	0.392	-49%
Manganese Dioxide	0.764	0.392	-49%
Nickel Oxide	0.764	3.131	310%
Carbon	1.524	3.131	105%
Electrolyte (proprietary)	1.144	3.131	174%
PVdF (Polyvinylidene fluoride or polyvinylidene difluoride)	0.380	0.785	106%
Aluminium foil	0.764	1.569	105%
Copper foil	0.688	3.131	355%
Mineral Oil	Not included	2.115	

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<b>Ethylene Glycol</b>	Not included	0.018
<b>R134A</b>	Not included	0.030
<b>Propane 1,2 diol</b>	Not included	0.218

The data indicates the quantity for material related to producing HF in a fire (electrolyte and PVdF) have increased for the entire site. There are also increases for other materials such as copper and aluminium foil but reductions for Cobalt Oxide and Manganese Dioxide.

The proposed changes increase the MW per container and the mass of materials that produce HF during a fire.

Based on this information, HSENI concludes the proposed changes increase the potentially harmful effect of a toxic fire plume.

Yours faithfully

**Notifications Team**