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LITHIUM-ION BATTERY INCIDENTS

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1. INTRODUCTION

BACKGROUND

Lithium-ion battery (LiB) fires are a growing issue for fire services around the world. The rise in the number of products and applications utilising the battery technology has been met with a steady increase in battery failures resulting in thermal runaway events and fires that are challenging for fire and emergency services, and sometimes tragic for fire victims.

About 1 in every 40 fires attended by Fire and Rescue New South Wales (FRNSW) during this report period involved a lithium-ion battery or battery device.

To better understand the issues, it is necessary to examine the incident and investigation data and capture any trends or insights available. This data will help to inform and prioritise research, prevention and education activities, fire safety advice and guidance, capability investment, operational practices, and firefighter training.

Data from FRNSW's incident reporting system has been presented in this publication in the interest of public safety and may be reproduced with permission (please contact research@fire.nsw.gov.au).

FRNSW in context

FRNSW is one of the world's largest urban fire and rescue services and is the busiest in Australia, responding to over 130,000 incidents per year including around 20,000 fire or explosion incidents.

FRNSW has a network of 336 fire stations, over 6,800 firefighters, approximately 4666 Community Fire Unit Members, 515 Administrative and Trades Staff, and a fleet of over 700 firefighting and support vehicles covering 179 fire districts, spanning an area of approximately 7,200 sq. km (720,000 ha) across NSW.

The state of NSW has a current population of approximately 8.4 million, with a population density of approximately 10.5 persons per sq. km. Sydney, the capital city of NSW and Australia's most populous city, has a current population of approximately 6.8 million and a population density of about 550 per sq. km.



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1. INTRODUCTION

DATA SOURCES

The data presented herein is a collation of a number of Fire and Rescue NSW data sources and may differ from previously reported data, which was derived from a single source (the eAIRS database only). It may also be subject to future updates, revisions and amendments. The analysis was conducted in August 2024 and is limited to completed incident reports from 1st January 2024 to 30th June 2024, inclusive. The following data sources were accessed:

FRNSW eAIRS database

FRNSW utilises an electronic incident reporting system referred to as *eAIRS*. The *eAIRS* database is a modified version of the Australian Incident Reporting System (AIRS or AIRSNAT) coding scheme as defined in the AIRS Manual, developed by the Australasian Fire and Emergency Services Authorities Council (AFAC). While the current *eAIRS* has some commonalities with the AIRSNAT coding, it is a standalone version unique to FRNSW.

In August 2020, AFAC recommended a number of changes to AIRS to capture battery fires. This included a number of new categories under “Form of Heat of Ignition” and some modifications to a number of categories under “Equipment Involved in Ignition”. As these fields were not available in *eAIRS*, and the suggested categories were inconsistent with *eAIRS* conventions, FRNSW conducted a review of existing categories and developed a set of 40 new codes to aid reporting of battery-related incidents. The changes were included in the “Material Ignited First”, “Ignition Source” and “Cause Determination” fields, and were implemented in September 2021 following a period of user acceptance testing.

NSW Fair Trading and SafeWork NSW Notifications

FRNSW reports incidents involving lithium-ion battery products to the NSW Department of Fair Trading (NSWFT) and SafeWork NSW where a business or place of work is involved. Information regarding the circumstances of the incident, photographs, information regarding the product(s) involved, and contact details of the owner are supplied via a separate form that is completed by reporting officers.

Fire Investigation and Research Data

Specialist Fire Investigators from the FRNSW Fire Investigation and Research Unit (FIRU), and/or SARET Research Officers attend select incidents where there has been significant injury or loss of life from fire, where the fire is considered major, unusual, suspicious or deliberate, or on request. Data has been updated where a specialist has been in attendance and/or has recorded further information.



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1. INTRODUCTION

ASSUMPTIONS AND LIMITATIONS

Quality and accuracy of data

In analysing fire incident data captured in the eAIRS system, it is assumed that reporting officers have entered information accurately and have made reasonable and educated determinations as to the origin and cause of the fire based on their training, experience, and the information available to them at the scene. As lithium-ion batteries are a relatively new fire risk and the levels of awareness and experience vary across the workforce, the quality of data also varies widely. Efforts have been made by the eAIRS Support team to verify the coding of data against free text descriptions provided and directly with reporting officers. Additional data from specialist investigators and researchers have been used where available.

Completeness of data

Data was extracted from eAIRS based on the assumption that at least one of the battery-related categories under “Material Ignited First”, “Ignition Source” or “Cause Determination” was used. There may be incidents where the reporting officer selected surrounding materials ignited first (e.g. bedding materials or soft furnishings), and could not determine the ignition source or cause with confidence, however a LiB or LiB-powered device was within the area of origin. Such incidents were not included in the analysis. Additionally, fire incidents where the LiB or LiB-powered device was not involved in the ignition, but became involved and contributed to the severity of the event are not captured in this analysis. Included in the analysis were a number of incidents in which a LiB-powered device was reported to have been involved in an incident (through a NSW Fair Trading Notification) in which FRNSW was called to manage the aftermath rather than the fire (“Other assistance” calls). Also included are waste management related fires where a LiB or LiB-powered device was identified or reported by witnesses to be the source.

Casualty information

eAIRS captures the consequences of fires as reported by the reporting officer at the completion of each incident. Fatalities may occur some time after an incident report has been completed and eAIRS is manually updated when a fatality is identified during the fire investigation process. Fatalities that occur after long periods of time may not be captured. Further, data on injured persons is captured when an injury is apparent at the time of the incident. It is therefore more likely to include severe injuries and/or those requiring ambulance attendance and/or transportation. Minor injuries and injuries which are not immediately apparent, or which manifest later, may not be included in the statistics. This analysis is limited to casualty data reported in eAIRS only. Detail of injuries or severity is not captured by FRNSW.

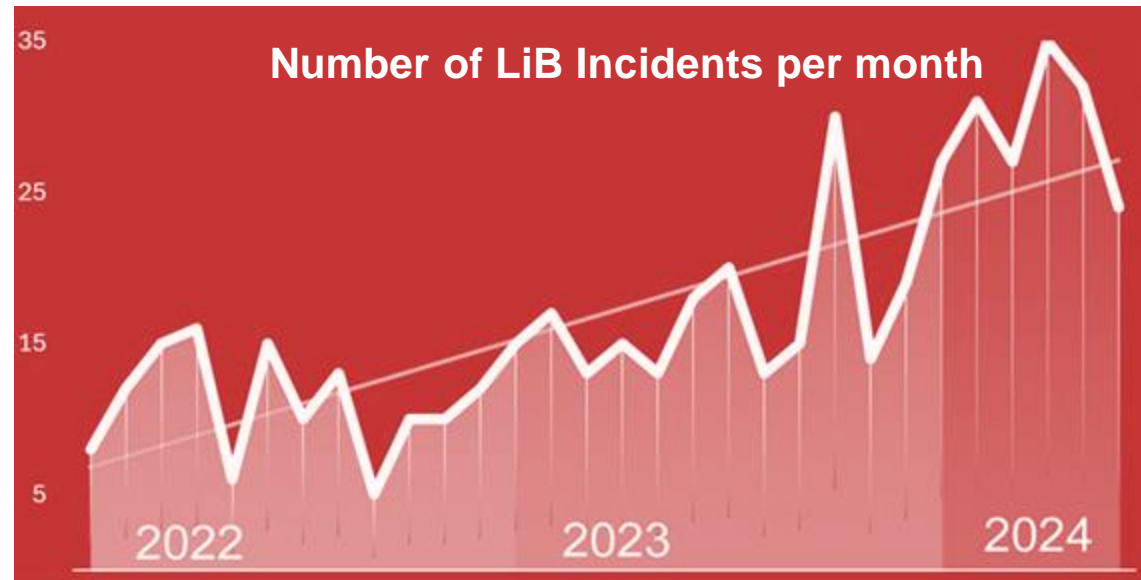


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2. LIB INCIDENT DATA

INCIDENTS ATTENDED AND CASUALTIES

	2022	2023	Jan – Jun 2024	Total
LiB incidents	171	285	217	673
Injured persons	14	38	16	68
Fatalities	0	0	2	2
Evacuations	829	1320	677	2826
Rescues	3	3	3	9



Fire and explosion incidents attended caused by lithium-ion batteries

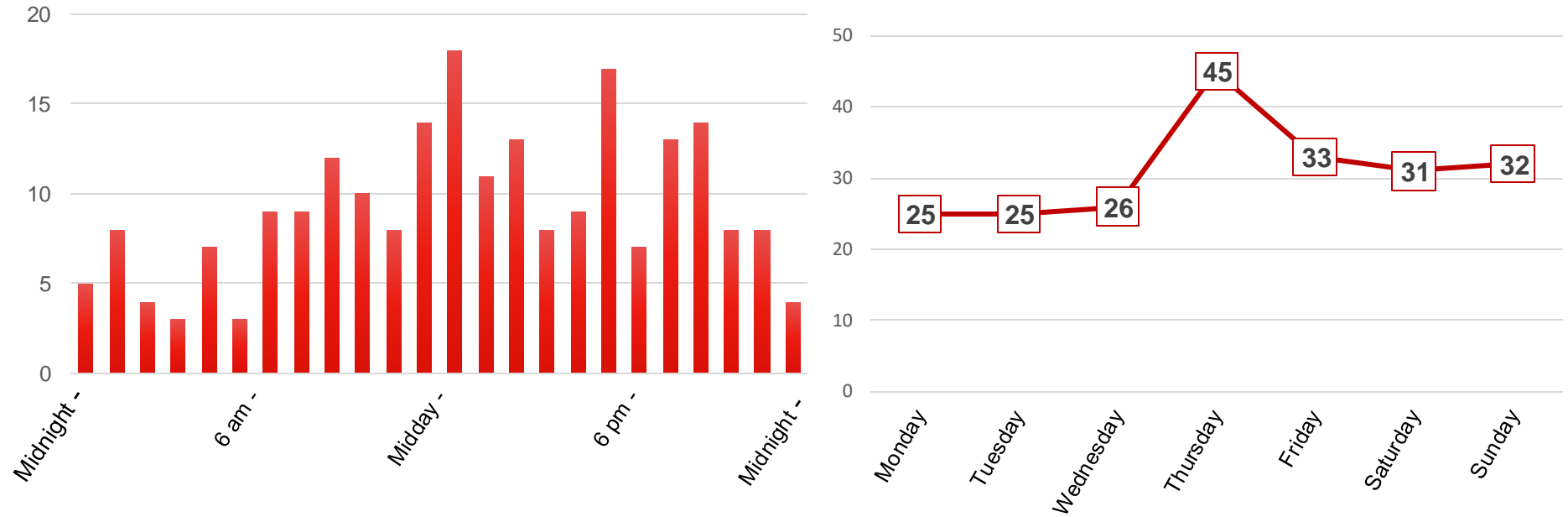
2022	1 in 100
2023	1 in 76
Jan – Jun 2024	1 in 40



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2. LIB INCIDENT DATA

TIME OF CALL



AVERAGE RESPONSE TIMES AND DURATION

Average Time (minutes)	2022	2023	Jan – Jun 2024
Response	9.3	9.0	9.0
Duration	72.9	122.3	111.7



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2. LIB INCIDENT DATA

INCIDENTS BY LOCAL GOVERNMENT AREA



Distribution of Incidents, Jan – Jun 2024

TOP LGAs	2022	2023	Jan – Jun 2024
Sydney	16	25	15
Central Coast	9	11	12
Parramatta	7	6	12
Canterbury-Bankstown	3	15	11
Blacktown	10	9	10
Inner West	3	11	10
Newcastle	5	7	7
Cumberland	7	16	6
Bayside	6	15	6
Northern Beaches	6	9	6
Wollongong	3	7	6
Sutherland Shire	7	11	5
Lake Macquarie	6	8	5
Fairfield	8	7	4
Campbelltown	3	8	4
Liverpool	1	11	1



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2. LIB INCIDENT DATA

INCIDENTS BY BUILDING TYPE/LOCATION USE

Building classification / Property location use	2022	2023	Jan - Jun 2024
Class 1a (detached) Residential detached house	42	89	63
Class 1a (attached) Residential attached dwelling (e.g. unit, terrace house, town house or villa unit)	20	28	27
Class 1b	2	3	2
<i>4 or more single dwellings located on one allotment for short-term holiday accommodation</i>	1	2	
<i>Boarding house, guest house, hostel or the like, not exceeding 300 m2</i>	1	1	2
Class 2	12	16	15
<i>Building containing 2 or more sole-occupancy units each being a separate dwelling</i>	8	14	14
<i>Mixed Commercial/Residential</i>	3	1	1
<i>Secondary dwelling (e.g. granny flat, garage or shed being used as residence)</i>	1	1	
Class 3	6	6	3
<i>Boarding house, guest house, hostel, lodging house or backpackers accommodation greater than 200 m2</i>	3	3	1
<i>Hotel or motel residence</i>	1	2	
<i>Hospital Residence</i>	1		
<i>Assisted care accommodation</i>		1	
<i>School Residence</i>			1
<i>Detention Centre</i>	1		1
Class 5 Office building used for professional or commercial purposes	3	7	3
Class 6	12	15	16
<i>Business/Commercial – Other</i>	8	8	12
<i>Shopping complex</i>	3	7	4
<i>Service Station</i>	1		



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2. LIB INCIDENT DATA

INCIDENTS BY BUILDING TYPE/LOCATION USE – cont.

Building classification / Property location use	2022	2023	Jan - Jun 2024
Class 7a Vehicle storage, carpark (not open or uncovered) including carstacking	2		
Class 7b	4	10	12
<i>Carpark (open or uncovered)</i>	2	4	7
<i>Storage property: Unclassified</i>		4	3
<i>General storage facility</i>	2	1	1
<i>Metal or electrical related storage</i>		1	1
Class 8	4	3	6
<i>Factory</i>	3	2	6
<i>Laboratory other than a health care or hospital facility</i>	1		
<i>Electrical network substation</i>		1	
Class 9b	5	5	9
<i>Sports stadium, sporting or other club</i>	3		1
<i>Educational related building (e.g. school, early childhood centre, preschool)</i>	1	2	4
<i>Transit related building (e.g. bus, railway, rail, airport or ferry terminal)</i>		1	2
<i>University</i>		1	
<i>Cinema, Theatre or Studios</i>	1		
<i>Licensed Premises</i>			1
<i>Public gathering related building (e.g. library, theatre, place of worship)</i>		1	1
Class 9c Aged care related facility	1	5	5
Class 10a	14	10	12
<i>Garage, carport or shed</i>	13	10	12
<i>Boat used as residence</i>	1		



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2. LIB INCIDENT DATA

INCIDENTS BY BUILDING TYPE/LOCATION USE – Non-Structural

Building classification / Property location use	2022	2023	Jan - Jun 2024
Non-structural	39	82	39
<i>Road, Street, Highway or Motorway (Public or Private)</i>	22	54	22
<i>Industrial plant yard area</i>	3	4	1
<i>Open land</i>	4	2	3
<i>Yards, non-residential (not primarily for storage)</i>	1	3	1
<i>Yards, residential</i>		4	4
<i>Electric transmission, distribution system (excluding substations)</i>	2	1	
<i>Managed non-hazardous rubbish disposal site</i>	1	2	2
<i>Railway property, excluding buildings</i>		2	
<i>Vacant allotment</i>	2		
<i>Uncovered parking area</i>		2	
<i>Public utility infrastructure (public mailbox, outdoor telephone booth, etc)</i>	1		2
<i>Cemetery</i>	1		
<i>Forest, hunting or fishing related area</i>		1	
<i>Caravan used as residence</i>		1	
<i>Sanitary service. Garbage and sewerage disposal.</i>		1	
<i>Managed hazardous materials waste disposal site</i>		1	1
<i>Boat used as residence</i>		1	
<i>Contractor's shed</i>	1		
<i>Yards, non-residential (primarily for storage)</i>		1	
<i>Coastline</i>		1	
<i>Playground, Park or Parklands</i>		1	2
<i>Port, channel or anchorage</i>	1		
<i>Not assigned</i>			1
Grand Total	171	285	217



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2. LIB INCIDENT DATA

STRUCTURE FIRES – SMOKE ALARM PRESENCE

2022 - 2023				Jan – Jun 2024		
Smoke alarm/detector present	Smoke alarm/detector not present	Not reported		Smoke alarm/detector present	Smoke alarm/detector not present	Not reported
64%	21%	15%	Class 1a (detached)	45%	20%	35%
90%	0%	10%	Class 1a (attached)	70%	19%	11%
60%	0%	40%	Class 1b	50%	50%	0%
79%	11%	11%	Class 2	60%	20%	20%
42%	0%	58%	Class 3	100%	0%	0%
70%	0%	30%	Class 5	67%	0%	33%
30%	22%	48%	Class 6	29%	18%	53%
0%	50%	50%	Class 7a	0%	0%	0%
0%	29%	71%	Class 7b	8%	23%	69%
43%	14%	43%	Class 8	33%	17%	50%
64%	0%	36%	Class 9a	50%	0%	50%
60%	0%	40%	Class 9b	33%	11%	56%
33%	0%	67%	Class 9c	40%	0%	60%
25%	63%	13%	Class 10a	35%	21%	44%
15%	38%	47%	Total	35%	21%	44%



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2. LIB INCIDENT DATA

STRUCTURE FIRES – SMOKE ALARM FUNCTION

2023			Jan - Jun 2024	
Smoke alarm/detector operating (where present)	Smoke alarm/detector not operating (where present)		Smoke alarm/detector operating (where present)	Smoke alarm/detector not operating (where present)
76%	24%	Class 1a (detached)	28%	17%
86%	14%	Class 1a (attached)	56%	15%
100%	0%	Class 1b	50%	0%
82%	18%	Class 2	60%	0%
100%	0%	Class 3	100%	0%
86%	14%	Class 5	67%	0%
88%	13%	Class 6	24%	6%
0%	0%	Class 7a	0%	0%
0%	0%	Class 7b	0%	8%
100%	0%	Class 8	17%	17%
100%	0%	Class 9a	50%	0%
67%	33%	Class 9b	22%	11%
100%	0%	Class 9c	20%	20%
50%	50%	Class 10a	0%	0%
86%	14%	Total	26%	9%



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2. LIB INCIDENT DATA

STRUCTURE FIRES - SPREAD OF FIRE

Location	2022	2023	Jan – Jun 2024
Structure	77%	71%	82%
Non-structure	23%	29%	18%

Fire spread	% of structure fires 2022 - 2023	% of structure fires Jan – Jun 2024
Confined to the object of origin	30%	22%
Confined to the room of origin	30%	19%
Confined to the floor/level of origin	4%	5%
Confined to structure of origin	9%	6%
Extended beyond structure of origin	2%	2%
Not reported	25%	46%
Total	100%	100%



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2. LIB INCIDENT DATA

INCIDENTS BY DEVICE INVOLVED

Material Ignited First	2022	2023	Jan – Jun 2024	Total
Electric bike, mobility scooter, ride-on toy	23	67	52	142
Charger (device), battery charger	19	27	6	52
Energy storage - battery, power supply, UPS,	16	21	5	42
Hand tool, power tool (battery powered)	15	10	17	42
Mobile phone	10	13	9	32
Powerpack / portable charging device	8	10	22	40
E-cigarettes, vape pens	4	12	4	20
Laptop / Tablet	7	6	7	20
Lamps, lights, torches (battery powered)	5	7	3	15
Remote control toy / craft - cars, drones, robots, watercraft	4	7	4	15
Vacuum cleaners - handheld, robotic (battery powered)	4	5	5	14
Audio devices, speakers (battery powered)	3	5	1	9
Battery pack, battery system (hybrid vehicle, electric vehicle)	4	3	3	10
Rubbish, trash, waste, chimney waste, vent waste	2	4	2	8
Personal care device - toothbrush, shaver, epilator (battery powered)		4	4	8
Sensor / control device (battery powered)	2	1	1	4
Phone handset, two-way radio, microphone (battery powered)	1	2	1	4
Automated / robotic equipment (battery powered)	2	1		3
Camera, camcorder, photographic equipment (battery powered)	2		1	3
Gaming devices (battery powered)	1			1
Personal device - watch, tracker, medical aid	1			1
Other battery, unspecified	38	80	70	188
Total	171	285	217	673



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2. LIB INCIDENT DATA

INCIDENTS BY TYPE OF DEVICE INVOLVED

Material Ignited First	2022	2023	Jan – Jun 2024	Total
Small portable devices	88	110	82	280
Micromobility devices	23	67	52	142
Energy storage systems	16	21	6	43
Electric and hybrid vehicles and batteries	4	3	3	10
Other battery, unspecified	40	84	74	198
Total Incidents	171	285	217	673



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3. SMALL PORTABLE DEVICES

DEVICE TYPES

Material Ignited First	Jan – Jun 2024
Powerpack / portable charging device	22
Hand tool, power tool (battery powered)	17
Mobile phone	9
Laptop / Tablet	7
Charger (device), battery charger	6
Vacuum cleaners - handheld, robotic (battery powered)	5
E-cigarettes, vape pens	4
Personal care device - toothbrush, shaver, epilator (battery powered)	4
Lamps, lights, torches (battery powered)	3
Remote control toy / craft - cars, drones, robots, watercraft	2
Audio devices, speakers (battery powered)	1
Sensor / control device (battery powered)	1
Phone handset, two-way radio, microphone (battery powered)	1
Camera, camcorder, photographic equipment (battery powered)	1
Total	85



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4. MICROMOBILITY INCIDENTS

DEVICE TYPE AND CHARGING STATUS

Type	2022	2023	Jan – Jun 2024	Total
E-bike	11	41	35	87
E-scooter	7	18	9	34
E-skateboard	1		2	3
Hoverboard	1	2	1	4
Mobility scooter		1	1	2
E-wheelchair	1		1	2
Toy car	1	1		2
E-surfboard		1		1
Unspecified	1	3	8	7
Total	23	67	52	142

	2022	2023	Jan – Jun 2024	Total
Actively charging	8 (34.8%)	30 (44.8%)	10 (19%)	48 (34%)
Recently off-charger	1 (4.3%)	1 (1.5%)	1 (2%)	3 (2%)
Not charging	2 (8.7%)	13 (19.4%)	12 (23%)	27 (19%)
Unconfirmed	12 (52.2%)	23 (34.3%)	29 (56%)	64 (45%)
Total	23	67	52	142



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4. MICROMOBILITY INCIDENTS

INCIDENT LOCATIONS

	2022	2023	Jan – Jun 2024	Total
Residential detached house	6	22	12	40
Residential attached dwelling (e.g. unit, terrace house, town house or villa unit)	8	14	7	29
Building containing 2 or more sole-occupancy units each being a separate dwelling	3	9	9	21
Road, Street, Highway or Motorway (Public or Private)		7	7	14
Business/Commercial - Other	1	4	3	8
Garage, carport or shed	1	2	1	4
Aged care related facility	1	1		2
Boarding house, guest house, hostel, lodging house or backpackers accommodation greater than 300 m ²	1	1	1	3
Open land	1	1		2
Office building used for professional or commercial purposes		1		1
Secondary dwelling (e.g. granny flat, garage or shed being used as residence)	1			1
Coastline		1		1
Railway property, excluding buildings		1		1
Storage property: Unclassified		1		1
Factory			2	2
Carpark (Open or Uncovered)			1	1
Shopping complex			1	1
Managed non-hazardous rubbish disposal site			1	1
Playground, Park or Parklands			2	2
Mixed Commercial / Residential			1	1
Total	23	67	52	142



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4. MICROMOBILITY INCIDENTS

BRANDS AND MODELS

Micromobility Brand	Incidents
Vinxs	4
DIY Kit	2
Stealth Bomber	2
Segway	2
Voilamart	2
Permobil	1
Lime	1
MGI	1
Acedeck	1
Suron	1
NCM	1
Elektra	1
Volt	1
Dirodi	1
Beam	1
Evolve GTR	1
Unknown	29
Total	52

Note: Brand names and models have been reported where they can be identified by the reporting officer. Not all devices are deemed at fault – failures can occur due to abuse or misuse. Where an electrical product (e.g. charger) has been deemed faulty, this has been reported to NSW Fair Trading for further investigation.



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4. MICROMOBILITY INCIDENTS

SERIOUS FIRES INVOLVING E-BIKES



On Thursday 29 February, four people were inside a townhouse at Teralba, Lake Macquarie when a fire broke out. FRNSW investigators believe a battery was compromised and immediately went into thermal runaway.

Two of the occupants escaped the intense flames but two others inside the townhouse were killed.

The tragedies mark what FRNSW regards as the first deaths in NSW in a LiB-related fire.

On 5 January 2024, a fire destroyed an e-bike shop, warehouse and workshop at Croydon, in Sydney's inner west. More than 60 firefighters and 15 fire trucks were deployed to Elizabeth Street, where the blaze broke out just before 5am.

Firefighters remained at the scene, where they continued to douse hotspots. They were assisted by crews in aerial fire trucks.

Fire investigators were unable to pinpoint the origin and cause of the fire due to the level of destruction but noted large stocks of LiBs and e-bikes at the premise.



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5. ENERGY STORAGE SYSTEMS

ESS FIRES ATTENDED BY FRNSW

	2022	2023	Jan – Jun 2024	Total
Energy storage - battery, power supply, UPS				
Battery energy storage system (BESS)	1	3	3	7
Uninterruptible power supply	7	7	2	16
Other, unspecified	8	11	1	20
Total	16	21	6	43

JAN – JUN 2024 BESS INCIDENTS

LIB chemistry	System capacity (kWh)	Building type	Recalled model?	CEC listed?	Address registered in AEMO DER?
LFP	5.12	Class 8	No	No	N/A
LTO	4 x 4.5	Class 9C	No	No	Yes, however device details inaccurate
Unknown	Unknown	Class 10A	Unknown	Unknown	No



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6. ELECTRIC AND HYBRID VEHICLES

EV BATTERY INCIDENTS ATTENDED

	2022	2023	Jan – Jun 2024	Total
Hybrid vehicle battery related	4	0	1	5
Electric vehicle battery related	0	3	2	5
Total	4	3	3	10

- Electric Truck: On 15th March FRNSW crews attended a fire in Berkeley Vale. Crews observed smoke and flames from a shipping container used as a charging station for lithium-ion truck batteries.
- Electric Bus: On 6th April, FRNSW crews attended a fire in an industrial area of St Marys. On arrival, crews observed a working fire involving a bus that was threatening neighbouring factory exposures. Multiple large batteries used in buses had caught fire which threatened surrounding homes and neighbouring business. Hazmat atmospheric monitoring and thermal monitoring provided by remote piloted aircraft continued until the cessation of FRNSW duties. Crews established a large exclusion zone and were in attendance for close to 64 hours.
- Electric Car: On 13th June, a firefighter suffered minor burns responding to a plug-in hybrid car incident in Camperdown. The cabin of the SUV was filled with smoke when FRNSW crews arrived and when the rear passenger door was opened, a flashover occurred. An independent fire investigator determined that the battery was involved in this incident.

Note: FRNSW has attended additional incidents involving electric vehicles or hybrid vehicles where lithium-ion batteries were involved and/or the vehicles had to be managed with caution due to the potential for battery failure. Only incidents where the origin of the fire was determined to be the high voltage lithium-ion battery are reported here.



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7. WASTE FIRES

LIBS IN WASTE

In the first half of 2024, FRNSW attended 7 waste and recycling fires in which the cause was identified as discarded LiBs in thermal runaway.

In March at Silverwater, the driver of a garbage truck had quickly dumped a burning load on a roadway soon after a collection from a commercial site. After the fire had been extinguished, crews found that over 150 e-bike batteries in the load.

Once they had been removed and placed on the nature strip to await collection, some of these batteries then went into thermal runaway and had to be carefully placed within drums of water to reduce the risk of further ignitions.



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8. SUMMARY OF MAIN FINDINGS

1. An analysis of available incident data revealed that FRNSW attended 217 incidents in the period of January to June 2024 where lithium-ion batteries (LiBs) or LiB devices were involved in ignition or failure.
2. This represents continued increase in incidents year-on-year, and a rise in frequency from about 1 in every 76 fires in 2023 to 1 in every 40 fires so far in 2024.
3. In February, NSW tragically recorded the first deaths in a fire caused by a LiB.
4. In this period, incidents involving LiBs were more than twice as likely to result in injury when compared with the injury rate of all fire and explosion incidents attended. (7.4 per 100 incidents compared with 3.5)
5. FRNSW attended LiB incidents spread across the state in 70 different local government areas. From January to June 2024, the areas with the most incidents included the Sydney, Central Coast, Parramatta and Canterbury-Bankstown LGAs.
6. About half (49%) of LiB incidents occurred in a residential setting.
7. Where a smoke alarm or detector was present, it was operating 74% of the time.
8. FRNSW has identified a growing trend in incidents occurring when working with, storing and handling LiBs in workplaces. Two (2) of the three (3) EV battery fires recorded in NSW during this period occurred in workplaces that handle large capacity batteries for electric buses and trucks. Multiple batteries stored in proximity poses additional fire risk.



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8. SUMMARY OF MAIN FINDINGS

9. 52 (24%) incidents involved micromobility devices or their batteries. Of these, 13% of incidents occurred on roadways, a projected 100% increase when compared with 2023.
10. Micromobility device incidents mainly involved e-bikes (67.3%) and e-scooters (17.3%). In five (5) of the incidents, there were multiple devices in storage within a residential setting.
11. E-bikes used by delivery riders have caused fires on roadways, during charging, and where they have been stored, sold or serviced. They often involve replacement batteries that have a higher capacity or charging equipment selected to accelerate charging, resulting in greater fire risks. Of the 32 E-bike incidents, 7 (22%) occurred whilst being charged and at least 8 (25%) involved high capacity (>2 kWh) batteries.
12. FRNSW recorded fires 9 (28%) of the 32 e-bike incidents in which batteries have been tampered with, repaired or replaced by both DIY enthusiasts and professional technicians. Working with lithium-ion batteries requires specific safe practices to mitigate the risk of fire and injury.
13. Two separate incidents involved users accidentally penetrating the batteries. One user mistakenly fitted a screw to the bicycle that was too long. The other was attempting to modify the e-bike. Both caused instant thermal runaway, with the later resulting in the complete destruction of a residential property.
14. FRNSW has now updated its forms to capture further detailed data regarding the circumstances, human factors, the battery articles, and the workplaces contributing to the number of LiB incidents attended.



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