Lithium-Ion Battery Management

A Sector Collaboration

15 heads are better than 1

Unimutual and TEFMA recognized a need driven by an increasing number of enquiries for guidance and assistance

Working party formed and comprised of facilities managers, WHS, project management and sustainability experts

The objective was to

- Provide clear, concise and pragmatic guidance regarding the management of emerging risks associated with lithium-ion batteries.
- Consider minimum requirements for the location and operation of charging points
- Help all stakeholders understand the risks and to minimize property damage should an event occur
- Minimize risks to campus communities generally.

Headlines in the Guidance Document

Managing the Risks

Context and Risk Landscape

Insurance industry perspective, growth figures, incident data

Risk Identification

LiB composition, what they look like, and risks presented

Risk Control and Mitigation

Control strategies, minimum protection recommendations

Operational Considerations

Education, operation, management, monitoring, contractor management, tenders, procurement and safe disposal

What’s in it For You

Reproduceable material for you to use

Useful facts and figures

Quick references tables

Risk assessment tables

Risk control and mitigation tables

Design considerations checklists

Procurement risk assessments

Greenhouse gas emission considerations

Tender questions and contract clauses

Heaps of links and references

Context and Risk Landscape

Context and Risk Landscape

The leading portable energy storage technology globally

Used in many of the devices we use daily

Increasing demand as the higher education sector advances its transition toward net zero emissions

Transport within and beyond campuses

Fleet vehicles

Maintenance and trade operations

Grounds maintenance

Cleaning

Here to stay and need to be managed

Insurance Industry Perspective

An increasingly costly and complex risk

Although essential to modern operations, LiBs present serious insurance challenges.

Underwriters seek “confidence around the management of thermal runaway risks, property risks, public safety liabilities, and transit and cargo challenges”

Insurers are placing greater emphasis on:

- Clear and enforceable strategies for safe charging and storage
- Ongoing maintenance and monitoring protocols
- Documented accountability for battery procurement, handling, and disposal
- Alignment with current safety regulations and standards

You Can Run But You Can’t Hide

With a growing demand comes a greater potential for incidents

Electric vehicle adoption continues to accelerate globally

PMDs, including e-bikes, e-scooters, and other micro-mobility options, are experiencing rapid growth in Australia

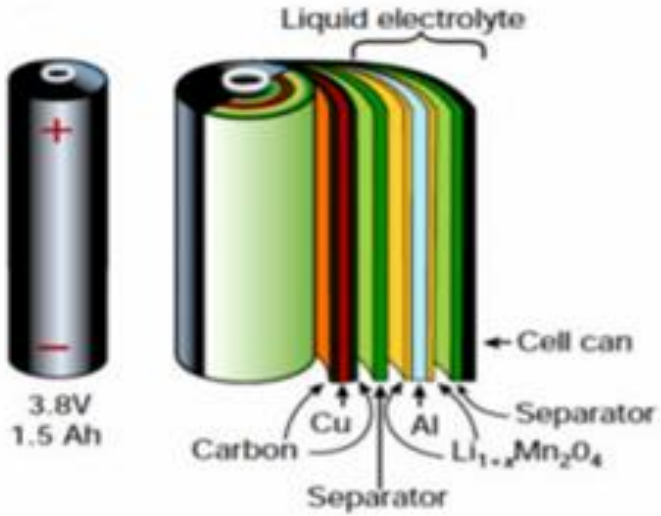
Lithium-ion battery incident statistics reveal a sharp and concerning upward trend in fire events

Underreporting of incidents is a barrier to understanding the true scale and nature of lithium-ion battery fire risks

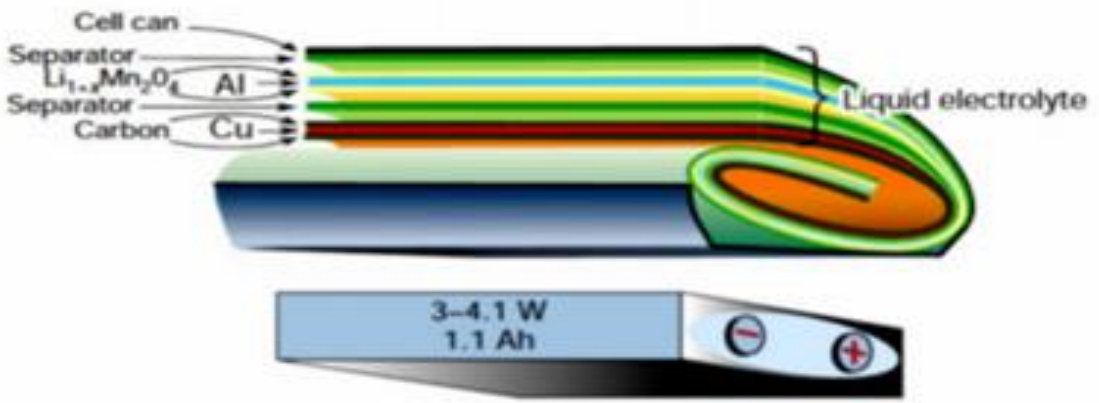
Now is the time for the sector to act – not only to prevent costly property damage, but to future-proof infrastructure and ensure a well-managed improving risk profile.

Risk Identification

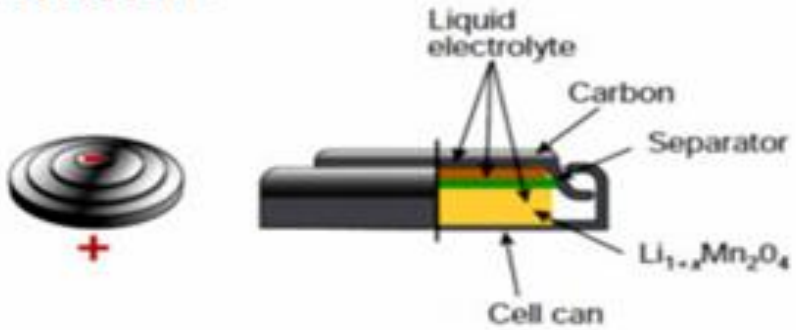
Cylindrical



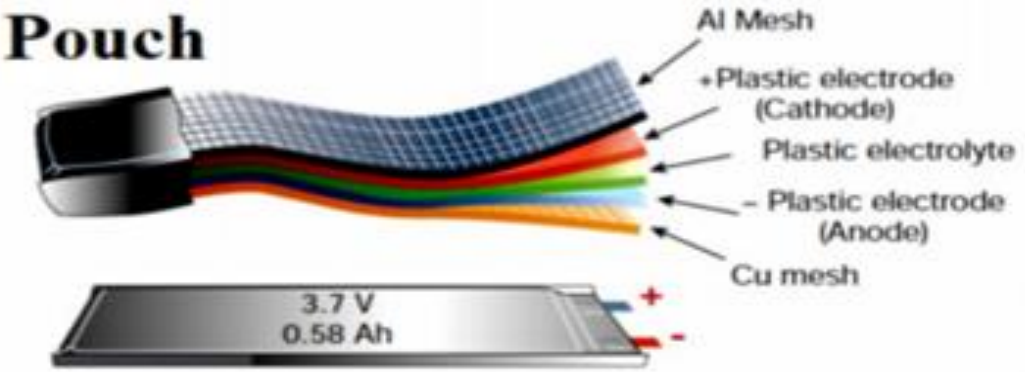
Prismatic

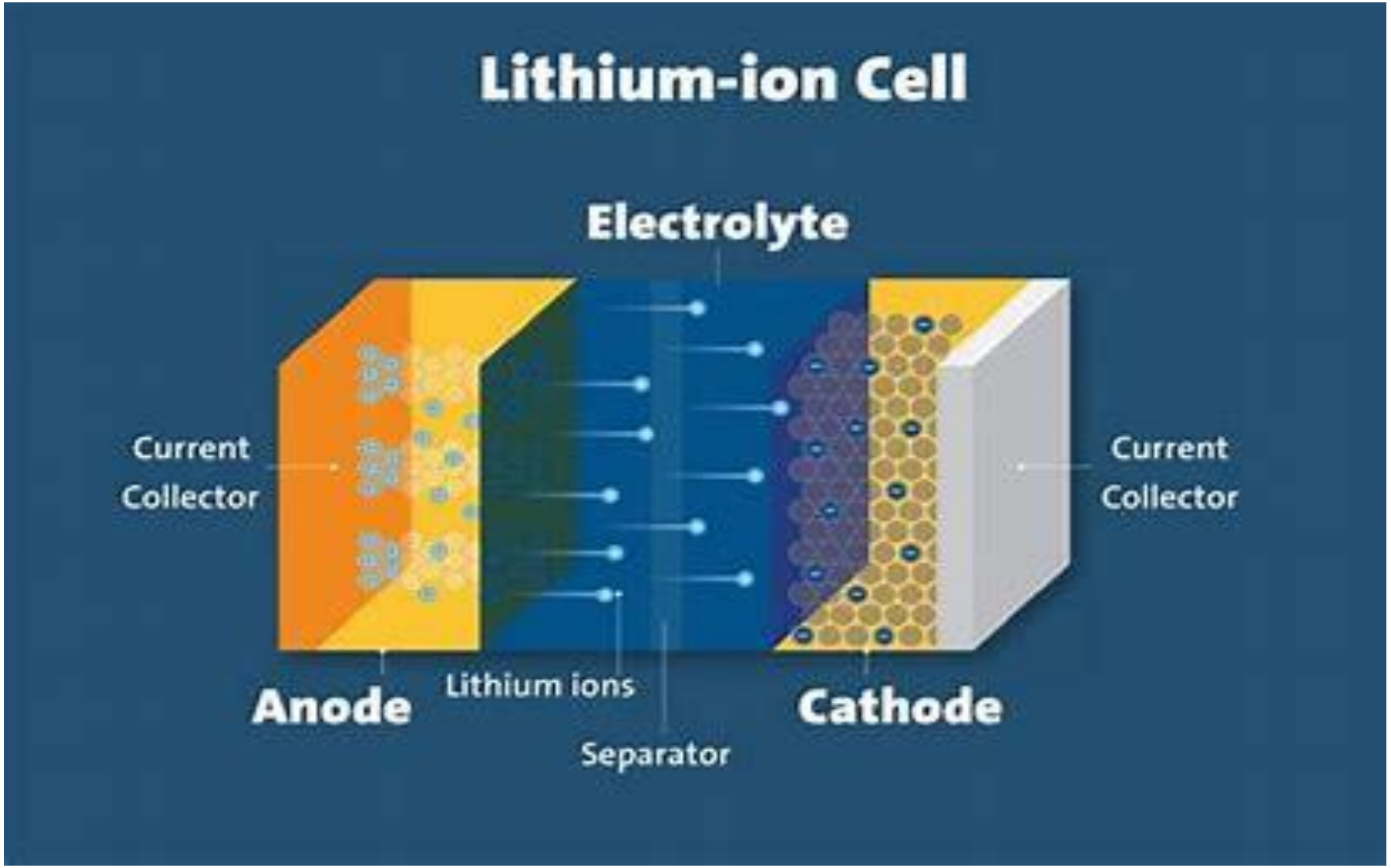


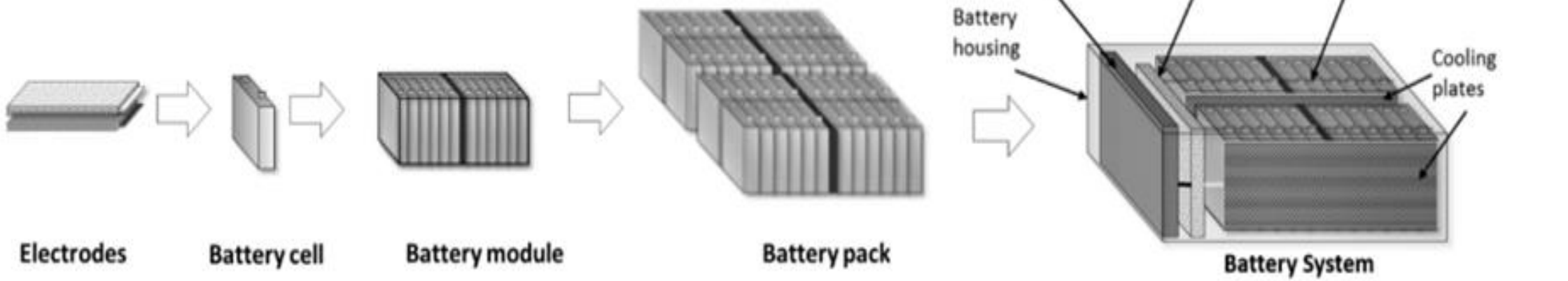
Button



Pouch




Lithium-ion Cell
Electrolyte
Current Collector
Current Collector
Anode
Lithium ions
Separator
Cathode


Electrodes
Battery cell
Battery module
Battery pack
Battery Management System
Cooling system
Connected battery cells & modules
Battery housing
Cooling plates
Battery System

Thermal Runaway

The Primary Hazard

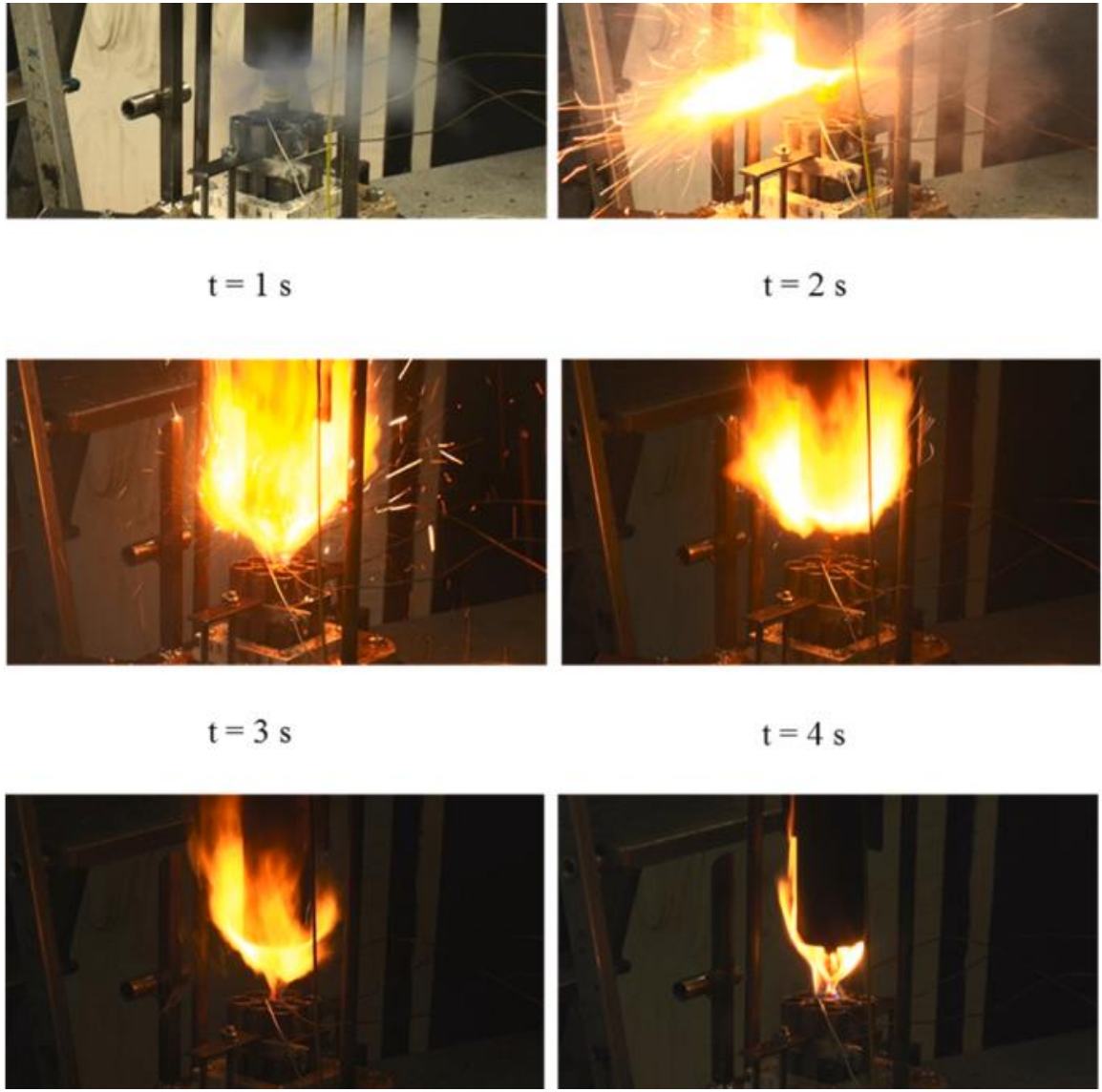
Can be caused by

- Poor quality construction and materials
- Damage to the battery
- Exposure to water or extremes of temperature
- Overcharging or using the wrong charger

Leads to internal component breakdown and a chemical reaction

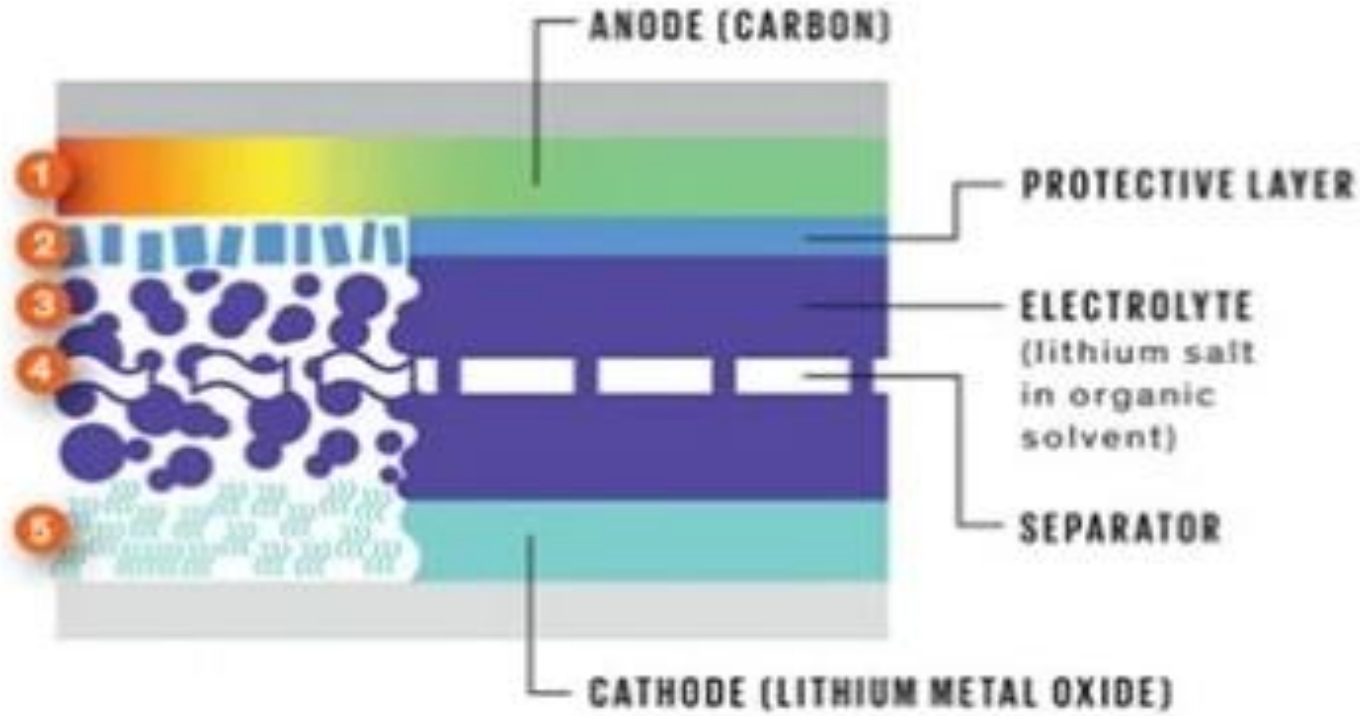
The reaction generates its own oxygen– that's why they burn so intensely and for so long

We're not dealing with fires that perform according to the traditional fire triangle



Thermal Runaway in a Lithium-Ion Battery

1. Heating starts.
2. Protective layer breaks down.
3. Electrolyte breaks down into flammable gases.
4. Separator melts, possibly causing a short circuit.
5. Cathode breaks down, generating oxygen.



Key Risks

Mostly Fire and Safety Related

Fire and explosion risks - Difficult to extinguish, rapid fire spread, Involvement of nearby vehicles, devices and combustible items

Structural and risks - damage to structural integrity of buildings

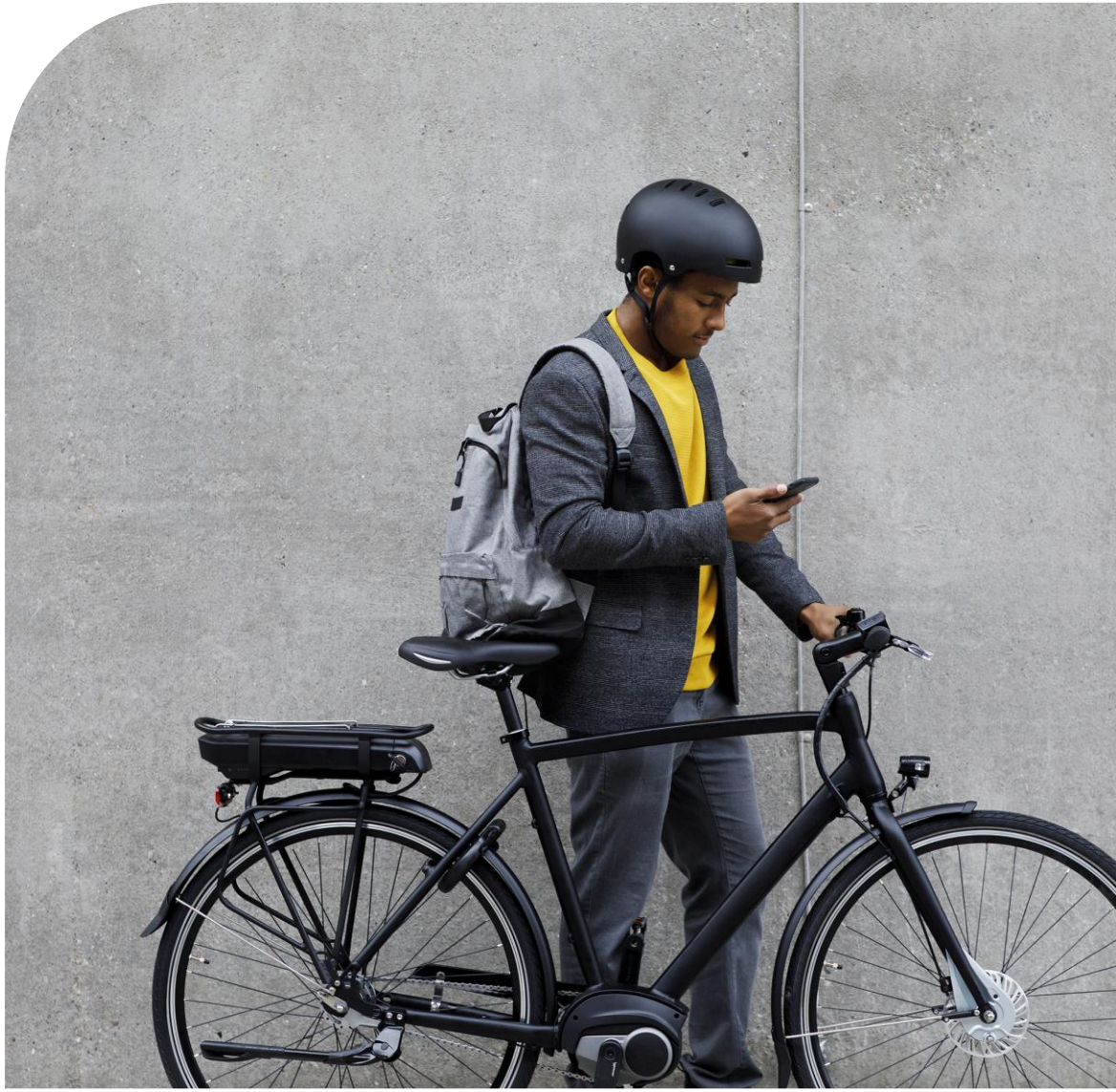
Environmental risks - contaminated run off

Electrical and energy risks

Transportation risks

Liability risks

Reputation risks



Key Insights

Be Aware of

High-Severity Events: Battery incidents generate disproportionate property losses – with fire events causing structural compromise, extended clean-up, and prolonged business interruption.

Inadequate Legacy Controls: Charging stations retrofitted into underground carparks, office corridors, or near egress paths pose high risks when unprotected.

Structural Degradation: Concrete spalling, smoke migration, and HVAC contamination are common in LiB-related fire events.

Reinsurer Pressure: Clear evidence of protection systems, spatial planning, and maintenance regimes are now essential to obtain right-priced protection.

Risk Control and Mitigation

Risk Control and Mitigation

Controls and Mitigation Strategies

Legislative framework – No real framework

Safety(WHS), Electrical safety Acts and Regs, Dangerous Goods Codes, National Construction Code, Standards

Administrative

Policy and procedure, contractor management, training, cyber

Engineering

Fire rating, compartmentation, fire detection and protection, ventilation, electrical protection

Behavioral

Signage, audits, prohibitions, messaging

Emergency Response

Planning and drills, signage, mapping and placarding

Minimum Considerations for Charging

Where and How Should We Provide Charging Facilities

New developments: Proactive risk management through design

Existing buildings: Legacy constraints and higher risk

EV risk-based approaches and policy responses

Emerging global and sectoral trends

Australian Building Code Board Advisory Note

Considerations checklist for EV charging equipment

Charging infrastructure for PMDs and utility equipment

Outdoor Car Parking Areas EV Checklist (Most Preferred)

- Prioritise outdoor locations with adequate space and electrical infrastructure
- Maintain 10m separation from adjacent buildings
- Avoid locating chargers under trees (fire and maintenance risk), or construct appropriate barriers to prevent fire spread to vegetation areas
- Provide separate charging points for PMDs and EVs
- Ensure firewater access adjacency to EV chargers
- Consider containment pits to manage contaminated water runoff
- Use solar-powered chargers where feasible
- Assess risks between trickle vs fast charging use cases (staff vs visitor)
- Space charging bays to prevent fire spread between vehicles

Operational Considerations

A Deliberate, Integrated Operational Framework

1. Education and Training

Integration with WHS frameworks

Incident Response and Emergency Preparedness

Signage and User Awareness

Cross-institutional and Role-specific Training

This integrated training approach equips higher education institutions not only to prevent LiB incidents but also to respond swiftly and effectively should emergencies arise.

A Deliberate, Integrated Operational Framework

2. Tools and Equipment

Drills, grinders, blower vacs, whipper snippers, mowers of all sizes, vacuum cleaners, some lab equipment, AV equipment and the list goes on

Greater exposure to potential for battery damage

Purchase only from reputable manufacturers and suppliers

Use supplied, or certified charging equipment

Ensure chargers bear the Regulatory Compliance Mark

Consider charging areas such as battery charging cabinets or storage and charging in modified shipping containers

A Deliberate, Integrated Operational Framework

3. Operation, Management and Monitoring

Implement Strict Charging Protocols

Regular Inspection and Maintenance

Use Quality and Certified Batteries Only

Ensure Proper Storage Conditions

Utilize Lithium-Ion Battery Charging Safety Cabinets

Install Smoke and Heat Detection Systems

Leverage Battery Management Systems

Follow Safe Movement and Transportation Protocols

A Deliberate, Integrated Operational Framework

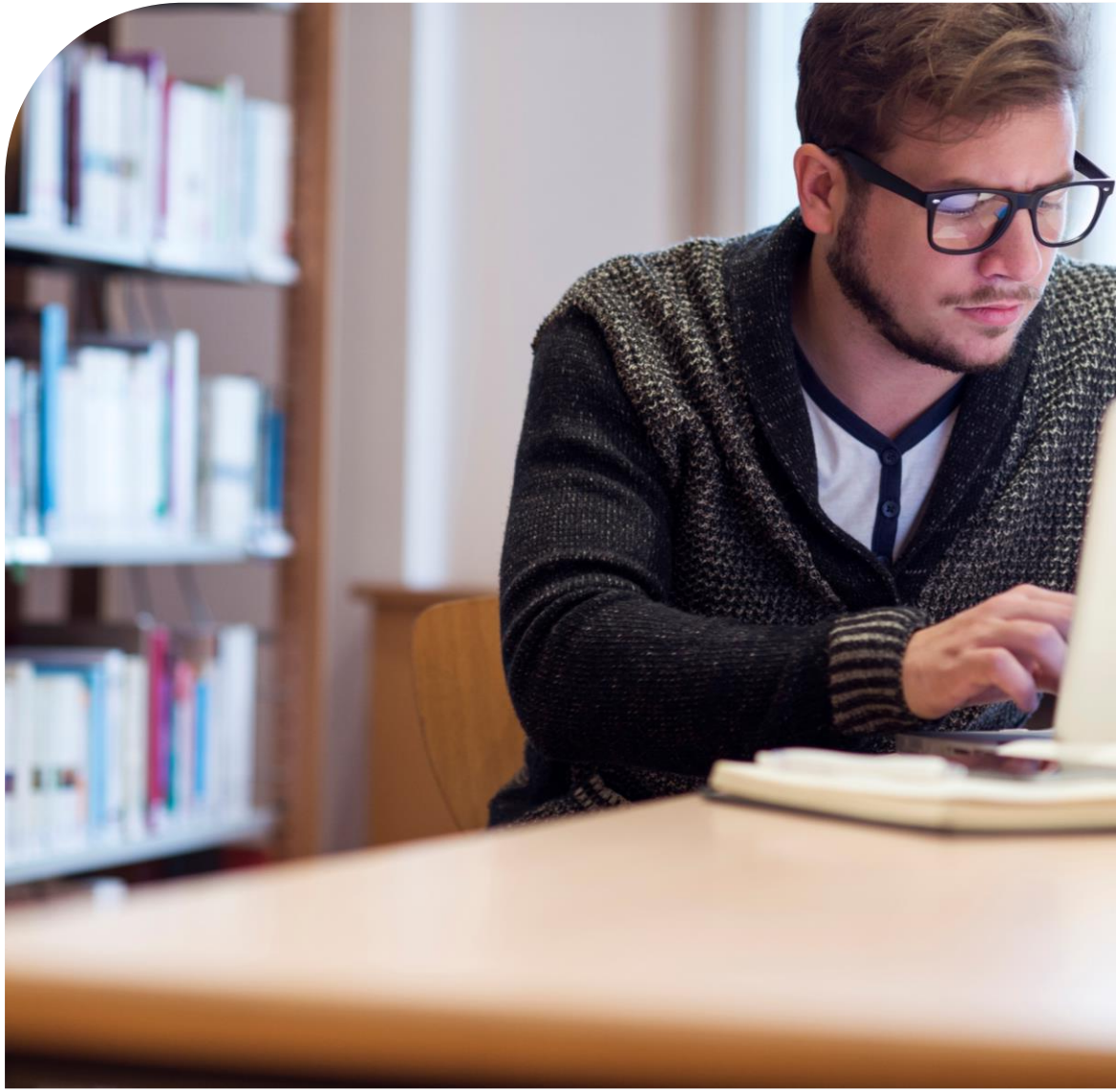
4. Procurement Considerations

Core Procurement Principles

- Value for Money
- Ethical Sourcing
- Modern Slavery
- Sustainability

Procurement Due Diligence

- Supply Chain Traceability
- Risk Assessment
- Product Assessment and Review



A Deliberate, Integrated Operational Framework

5. Contracts, Tenders and Contractor Management

Effective contractor management begins at the pre-tender stage

Key Questions and Considerations for Tenders, Contracts and Contractor Management

Example Contract Clauses

Performance KPIs for Contractor Management

Safe battery management must be traceable through both contractor actions and institutional oversight.

A Deliberate, Integrated Operational Framework

6. Safe Disposal of Lithium-ion Batteries

Safe disposal of LiBs is a growing public safety concern in Australia

Universities and higher education institutions have a duty of care to manage the risks associated with battery disposal

There are various battery recycling programs and initiatives across Australia

State and territory environmental protection agencies (EPAs) also manage programs and regulations to address battery recycling

Disposal process flowchart

https://unimutual.com

https://www.tefma.com

Q & A

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