






# Flow battery and Lithium-ion safety and deployment

As renewable energy grows, long-duration, safe and reliable storage is critical. While lithium-ion (Li-ion) dominates the market, its fire risks have led to growing concerns. **Flow batteries** offer a **safer and vertically scalable alternative**, with major **advantages for urban and critical infrastructure** projects, and a significantly **smaller footprint**.

	Li-ion 	Flow batteries 
<b>Safety profile</b> 	Risk of thermal runaway → <b>fires and toxic gas</b> release, difficult to extinguish, <b>requiring spacing, fire suppression, and cooling</b> .	Use non-flammable water-based electrolyte → <b>no fire risk, no toxic gas, safe across -40°C to 80°C</b> .
<b>Deployment</b> 	<b>Limited siting flexibility</b> ; fire safety concerns <b>restrict</b> use in <b>urban areas and buildings</b> . <b>Scaling up</b> capacity means increasing number of containers, raising <b>costs</b> and increasing areal <b>footprint</b> .	Can be freely deployed <b>indoors</b> , in basements, <b>or dense urban areas</b> , and in <b>extreme environments</b> . Outdoor deployment requires <b>minimal space</b> . Higher areal energy density and <b>easy scale up</b> , minimising land use, maximising deployment opportunity.
<b>Safety requirements</b> 	International standards (IEC) generally <b>require</b> at least 6 meters <b>spacing</b> between containers <b>due to fire risks</b> , and 30 meters spacing from buildings.	Safety requirements <b>do not restrict spacing or deployment</b> and rather focus only on chemical hazards and mechanical safety.

## → Advantages of flow batteries:

- Non-flammable → **no fire risk**
- Operate safely across in **extreme heat & cold** with **no performance loss**
- Can be deployed inside **buildings and cities**
- Long life (**20+ years**) with no performance fade, **high cyclability**
- **Scalability** allows for increased power and energy within **smaller footprint**