Standards & Engagement

Circular Economy and Circularity Metrics

ULSE Sustainability Program

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Safety Science in Action™

UL Standards & Engagement

120 years of standards development

400 technical committees

81 MOUs

4,000+ TC members

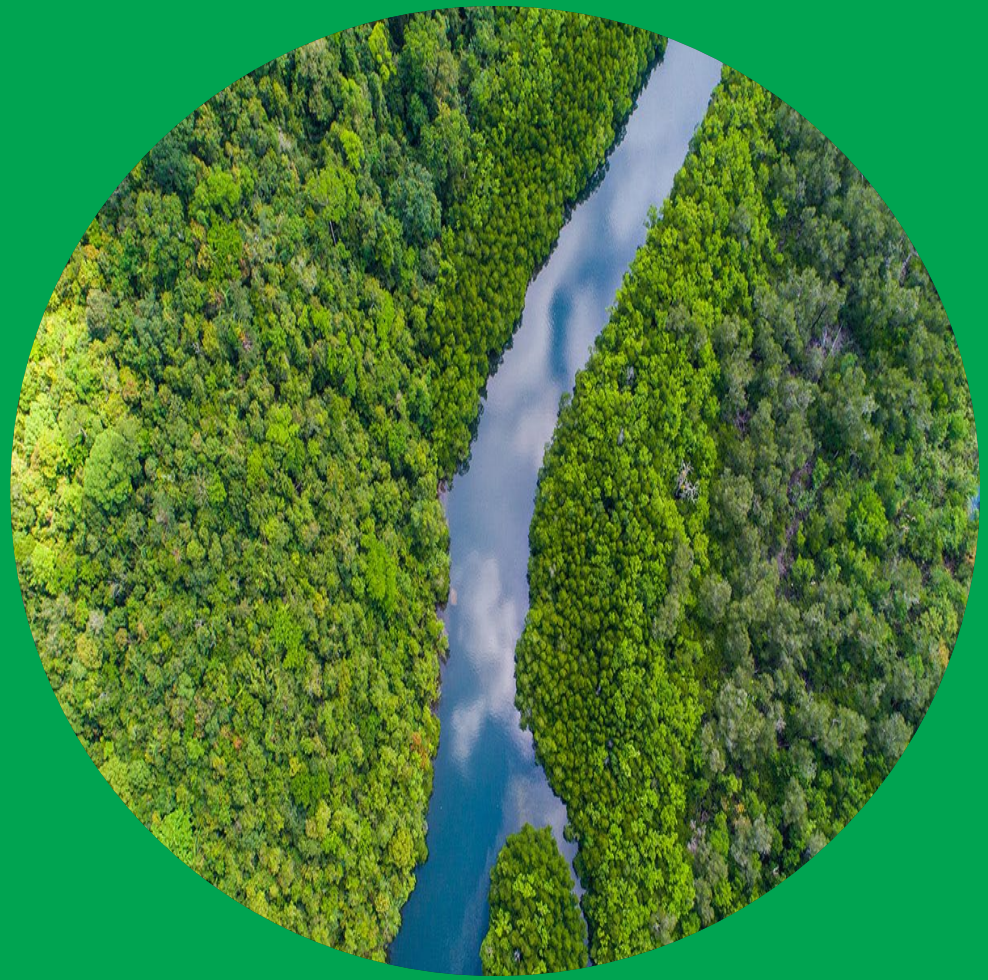
20% international membership on TCs

40+ countries represented on TCs

1,700+ standards published

UL Standards & Engagement

Sustainability Program



8 in-scope SDGs set the high-level guardrails for where the Sustainability Program will consider playing

Out of scope

Relevant for ULSE's focus on environmental sustainability

Ensure availability and sustainable management of water and sanitation for all

Ensure access to affordable, reliable, sustainable and modern energy

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Make cities and human settlements inclusive, safe, resilient, and sustainable

Ensure sustainable consumption and consumption patterns

Take urgent action to combat climate change and its impacts

Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Protect, restore, promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation and halt biodiversity loss

Source: UNDP

Circular Economy

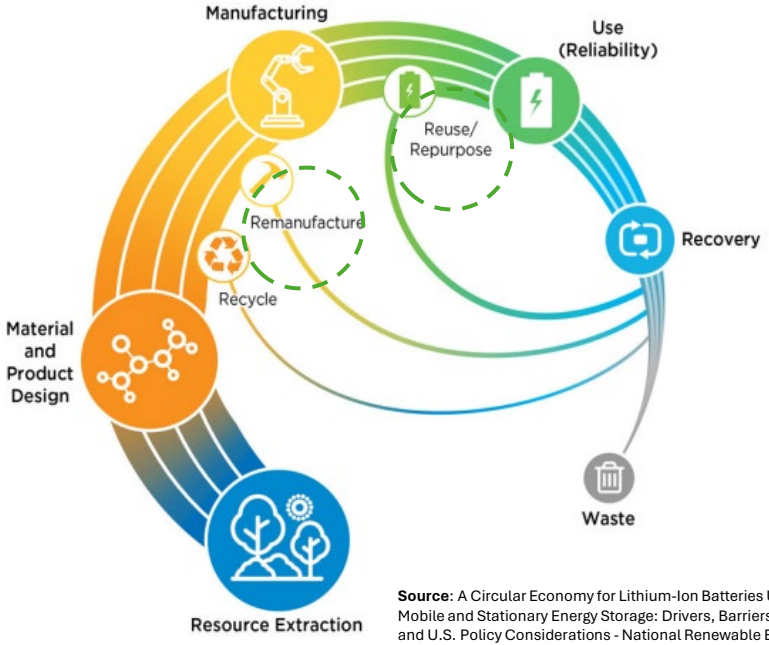
What is it?

Practice of keeping products and materials in use, or ‘in the economy’, while minimizing the environmental impact of sourcing materials, of maintaining the products and materials usage, and of the material life after use.

Why do we need standards?

- No current method to baseline your circularity practices
- No current method to influence an increase in circular processes via circular practices
- Enabling third party validation / assessment

UL 1974
Evaluation for Repurposing or Remanufacturing Batteries



Source: A Circular Economy for Lithium-Ion Batteries Used in Mobile and Stationary Energy Storage: Drivers, Barriers, Enablers, and U.S. Policy Considerations - National Renewable Energy Laboratory (NREL)

- Addresses safety concerns of retired EV batteries for second life applications, e.g., BESS – Battery Energy Storage System
- One of the first in the world published since 2018. Recognized as ANSI/CAN standard
- Second Edition published 2023 with major revisions, including scope expansion to cover remanufacturing of batteries
- **UL Technical Committee 1974** with 50 experts from 11 economies including the US; Canada; China; Japan; Korea; Singapore; Taiwan; Germany; India; Malaysia; Thailand.

ANSI/UL 3600

Standard for Measuring and Reporting Circular Economy Aspects of Products, Sites and Organizations

Material Flow Metrics

- Measuring Input and output of products
- Measuring Input and output of sites
- Organization, as a whole, is the combined total of all products and sites

Other Metrics

- Life cycle assessment (LCA) impact
- Energy impact metric calculations
- Water impact metric calculations
- Air quality and greenhouse gas (GHG) emission impact metric calculations
- Social impact

Circularity transparency labeling

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UL 3601

ULSE developed the **Standard for Measuring and Reporting Circularity of Li-Ion and Other Secondary Batteries** seed document (UL3601) to help improve the circularity of lithium ion and other non-acid chemistries.

Market drivers

Rising demand: Global demand for lithium-ion batteries expected to grow by > 500%, with the number of GWh required increasing from ~700GWh in 2022 to ~4.7TWh by 2030.[1]

Environmental pressure: By 2030, waste batteries will hit 1.2 million tons.[2] Circular strategies to reduce environmental impact and enable recycled materials in new batteries.

UL 3601 value

Technical guidance: Standard will help companies better understand best in-class practices to implement circularity in battery design, production and management.

Market recognition: Certification and alignment with the standard will help build trust in the market for the adoption of more sustainable and circular batteries.

Sources:
1. Global Li-ion battery demand 2022-2030 | Statista;
2. Lithium batteries – 1.2m tons ready for recycling by 2030 – pv magazine International (pv-magazine.com)

High level approach to drafting seed document

Tech Writers provided support to ULSE for the drafting standard seed document through the following activities:

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Legend ★ Tech Writer supporting activities

Applying Circular Economy & End of Life Management Best Practices for Electrification Technologies

Small wind turbine systems

PV modules and panels

E-mobility equipment

Scoping: How to define ‘electrification products’

UL electrification definition

UL Standards & Engagement (ULSE) focuses electrification safety on products and systems utilizing rechargeable energy storage devices (and systems), stationary or mobile, aimed at supporting energy demands and replacing technologies traditionally powered by fossil fuels.

Electrification addresses the following:

- All aspects from components to entire systems
- All associated equipment required for charging and discharging
- Industrial and consumer uses
- Less carbon-intensive electricity generation
- Horizontal battery requirements (e.g., common battery safety requirements associated with end products.