

Sustainable Energy: Recycling Renewables

Just as sustainability is at the heart of our industry, circular-economy principles are central to the Canadian Renewable Energy Association (CanREA). This series of factsheets on Recycling and Renewables examines the current recycling options for wind energy, solar energy and energy-storage technologies in Canada, and points the way for the future.



Recycling energy storage components in Canada

Recycling and renewables go hand in hand. But what happens to renewable energy-storage components when they reach the end of their life span? This CanREA fact sheet examines the current recycling options for grid-scale lithium-ion batteries in Canada.

Canada's energy-storage fleet

Scalability and flexibility have anchored lithium-ion batteries as a staple of today's society. From small cell-phone batteries to large-format electric-vehicle batteries, all the way up to power grid mega-projects, these chemical energy-storage devices are everywhere.

Grid-scale lithium-ion energy-storage systems have been deployed across a range of pilot projects, as well as fully commercialized projects, since 2012. Current lithium-ion grid storage capacity is below 100 MW in Canada, but with battery pack prices dropping quickly ([89% since 2010, and counting](#)), growth is expected to accelerate dramatically.

Giving a site new life

One great thing about lithium-ion energy-storage systems is that they are long-lived. As a modular system, individual cells can easily be replaced if they become damaged, faulty or degraded. As long as the core infrastructure (power cables, foundations, heating/cooling systems) remains in good shape, the whole system can carry on with minimal maintenance.

The batteries themselves are generally expected to exceed ten years of operation, depending on the number of charges and discharges they experience, as well as the speed and frequency of these events. In this respect, each site will have a unique life expectancy, accounted for by the project-developer.

Grid-scale storage is a great way to re-use vehicle batteries which are no longer suitable for long trips but are well within performance standards for stationary applications. Plans are already in place within some Canadian jurisdictions, such as the City of Edmonton, to repurpose electric-bus batteries in this manner.

Lithium-ion batteries are 95% recyclable

Approximately [95 percent](#) of a lithium-ion battery can be recycled into new batteries. In fact, the metals used in lithium-ion applications, such as lithium, nickel, and cobalt, hold their value beyond the life of the battery, allowing recycling facilities to reclaim these materials. Recycled metals command prices that are beginning to compete with metal from mining operations.

A battery energy-storage system consists of several additional components, such as housing units, air conditioning components, concrete pads, electrical controls and wiring. Like the batteries themselves, these components have well-established recycling pathways.

Recyclable materials in energy-storage systems

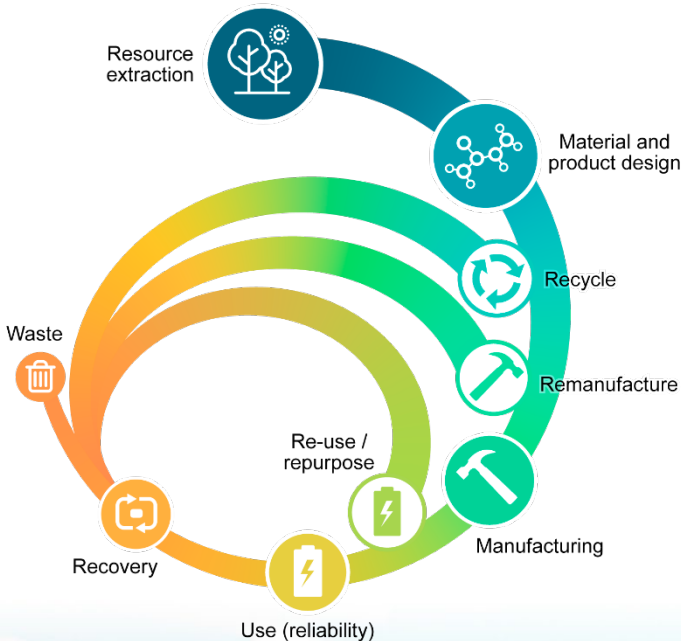


Canadian ingenuity

Lithium-ion batteries are also used in sectors other than renewable energy. The prevalence of batteries from portable electronics and electric vehicles has inspired Canadian companies, such as [Li-Cycle](#) and [Lithion](#), to develop processes and facilities to handle this waste stream.

These technologies are already being exported, giving Canada a foothold in the massive opportunity that is emerging within this market.

A circular economy for lithium-ion batteries



Think globally

In Canada and around the world, energy-storage systems using lithium-ion batteries are getting bigger and more impressive. So are recycling processes.

Recycling costs will continue to decrease as the recycling process improves and the supply of these valuable materials increases.

The shift to sustainable forms of energy is a global movement. While Canada continues to innovate and produce storage solutions to support the deployment of wind and solar power, we will also benefit from a growing industry focus on sustainability through circular economy principles.

Next steps

In Canada today, end-use electricity consumers, as well as manufacturing facilities with strong Environmental, Social, and Governance (ESG) goals, are fueling new interest in working with CanREA to eliminate carbon emissions and improve sustainability throughout the supply chain.

As Canada's fleet of wind energy grows, CanREA members are examining new ways to innovate and close the circular economy loop. From the sourcing of raw materials to the final disposal and reuse of components, the opportunities to push further into sustainability over the full life-cycle of our technologies continue to expand.

For more information

Learn more about recycling and renewables in the "Life Cycle" section of the CanREA website: [Repowering and Decommissioning](#).



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WIND, SOLAR, STORAGE.

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