Battery research and development canada

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Analysis and assessment of capacity building, skills, and human resources ...

There is significant potential to increase resource production to develop a ...

As Canada advances to a sustainable and prosperous net-zero future by 2050, the ...

With the world"s energy needs changing rapidly, the development of advanced energy storage devices (batteries) is critical to responding to the growing demands of renewable electricity generation, electric vehicles, and other portable electronic devices around the globe. Battery technologies will play a significant role in an electrified society and could provide about 30% of the emissions reduction in the transport, power, and industry sectors until 2030.

Today"s lithium-Ion batteries still have limitations: their energy density is limited, charge times are long and they can catch fire or explode in rare circumstances. The goal of the consortium is to develop innovative battery technology that overcomes all of these limitations. Members of the consortium are developing battery materials and prototypes that have a five to 10 times higher capacity and energy density, can be charged faster, and are safer in deployment. The consortium will develop the infrastructure to run small scale production so that new batteries can be deployed in high-value applications, such as in health care, remote work sites and aerospace applications.

Lithium, the lightest metal with the highest electrochemical potential, is a highly versatile element widely used in batteries and ideal for small items such as cell phones. Lithium-ion batteries hold a charge for longer than lead-acid batteries and charge more quickly than traditional batteries.

The lithium-ion battery (LIB) value chain provides annual revenue opportunities of $300 billion by 2030. Over the next decade, $440 billion in cumulative investments along the value chain, will be required. The LIB supply chain, in different areas, from mining to cell manufacturing and recycling, will experience significant growth by 2030. Almost 50% of today"s lithium is extracted for battery-related applications, increasing by a factor of six times from 2018 to 2030.

The University of Calgary (UCalgary) is leading a battery technology development initiative called the Western Canada Battery Consortium (WCBC) that will support Western Canadian efforts for sustainable energy development and economic diversification. Lithium is available in large quantities in brines in the Western provinces. Hence, Alberta has the opportunity to become a world leader from resource extraction over battery production to recycling of new energy storage technologies.

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The goal of WCBC is to work pan-institutionally to employ world-class battery technology research at several Canadian universities in advancing battery technology and supply chains in Canada, and to contribute to economic diversification and value retention in local communities. WCBC will develop safe, robust, high energy density solid state batteries that have about five times the energy density as the current generation of Li-ion batteries (LIBs). These batteries will be made from locally available lithium and sulphur resources and will play a critical role in renewable energy integration with the electric grid and advanced battery-powered mobility and transport applications in Canada.

WCBC"s research and activities will be fully aligned with the University of Calgary"s energy research, the Government of Alberta"s Research and Innovation Framework and 2030 Innovation Targets, and the Canada"s greenhouse gas emissions reduction targets. The consortium will have economic and employment impacts in Western Canada, and put to use the resource and energy talent that are located in Alberta and the battery chemistry and engineering expertise found at both UCalgary and the University of Alberta.

Within UCalgary, the Battery Innovation Hub initiative, with over ten faculty members working in the electrochemical energy storage area, is a significant contribution to WCBC and the sustainable energy efforts of Alberta and Canada. The hub"s vision is to be a world-class research and development and innovation center of Western Canada on Li-ion and next-generation high energy density (five to 10 times compared to state-of-the art LIBs) solid-state batteries. Such batteries will be used for drones within the agricultural sector as well as numerous applications within the space, health and tech sectors.

The hub will provide battery researchers and industry partners the facilities and experts to help them evaluate, certify, and qualify every step of battery development. Western Canada is home to some of the finest institutions with brilliant researchers of the energy industry - researchers that are capable of taking the lead on energy storage research and development to grow the battery industry in Canada and support the domestic supply chain. As Alberta moves forward with the installation of renewables, there is a fundamental need for developing safe and cost-effective Li-batteries. The consortium gathers the finest energy researchers in the Western Canadian Universities and around Canada to concentrate efforts on battery development with the Battery Innovation Hub as the center.