UNIVERSITY OF ALBERTA

HYDROGEN RESEARCH

AT THE UNIVERSITY OF ALBERTA

As the world transitions from fossil fuels and moves towards decarbonization, new energy sources will power our day-to-day lives. One of the cleanest new sources of energy is hydrogen, unlocking new possibilities for industry and economy. By 2050, the Hydrogen Council estimates the worldwide market for hydrogen will be worth more than $2.5 trillion per year. With Alberta leading Canada's hydrogen production, hydrogen research and innovation is a priority at the University of Alberta (U of A).

Hydrogen does not naturally occur in its molecular form on Earth. It is made by converting a primary energy source (fossil fuels, nuclear power, or green energy) into a secondary fuel. As hydrogen is nearly ten times more energy dense by volume than lithium-ion batteries, it is an easily transportable source of electricity that is two to three times more efficient than an internal combustion engine. Its only byproduct is water, making it more sustainable than other forms of energy.

Jason Olfert

Hydrogen will power the future

From finding affordable answers to electrification, to providing expert insight into a cleaner-energy strategy, to practical solutions that reduce greenhouse gas emissions, the U of A community is working together to address global challenges in the energy market. Researchers at the U of A are world-renowned across disciplines for their work on hydrogen. Researchers at the U of A progress work on the development of the entire hydrogen value chain. U of A has developed technologies that use microwaves to make hydrogen, and researchers are advancing innovations in methane pyrolysis (a process that breaks a material into smaller, more volatile molecules), biomass-based hydrogen and solar-based hydrogen technologies, among others. Meanwhile, the economic, social, and environmental implications of hydrogen development and use are also being explored at the U of A. Researchers are modelling the economic outcomes and environmental footprint along the hydrogen value chain, which will inform investment decisions and policy formulation.

Learning in action

The world needs more highly-trained chemists and engineers to grow the clean energy sector and lead advances in industry and in research. The U of A is already training the workforce of tomorrow with undergraduate engineering students participating in co-op programs in the industry. Graduate students in the Master of Business Administration and Master of Engineering combined degree program become industry-ready with the skills, training, research knowledge and entrepreneurial spirit needed to put hydrogen technologies into action. They further this experience through companies founded at the U of A, which also helps to ensure Alberta's leadership in this emerging sector. The U of A is training the next generation of innovators while commercializing research and creating jobs.

Minza Haider

"Electric and hydrogen vehicles will offer a green bargain for Alberta's transportation sector"

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