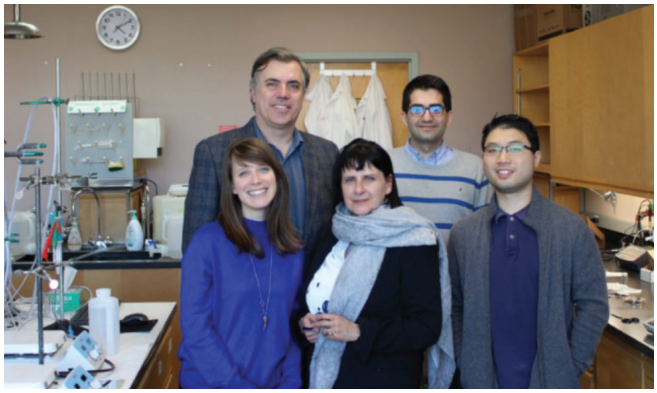
A Customer Success Story

CMC RESEARCH - ACCELERATING INNOVATION

AGORA ENERGY WORKS WITH CMC RESEARCH TO TEST AND DE-RISK COMPONENTS OF THEIR INNOVATIVE CO_2 REDOX FLOW BATTERY

Agora Energy Technologies Ltd. is an electrochemical engineering company developing a ground-breaking battery technology that directly utilizes captured CO_2 from industrial emitters and stores electricity.

Their unique metal-free battery technology, namely the CO_2 Redox Flow Battery (CRB), enables long-lasting and low-cost storage of renewable energy, while simultaneously utilizing large amounts of CO_2. Agora Energy owns the worldwide intellectual property for this battery technology.



Agora Energy Technologies team with Dr. Christina Gyenge, CEO

CHALLENGE

Agora Energy, a company with a strong electrocatalysis division, has developed its proprietary bi-functional catalyst through extensive bench-scale R&D. To move toward prototype assembly and testing, the company was looking to investigate their catalyst in a larger flow cell configuration under conditions closer to industrial applicability. To achieve this, they sought the services of a partner with expertise along with facilities with the right infrastructure and equipment that could move quickly and cost-effectively to design and test larger flow cells. Of particular significance was the fluid dynamics testing of the two-phase gas-liquid flow.

SOLUTION

Agora Energy worked with CMC Research as their partner to design and build a flow cell and to test the gas-liquid flow behaviour under various conditions. The project was also supported by an NRC IRAP grant to CMC Research. Using its plug-and-play facility, CMC Research had the instrumentation and equipment to conduct a thorough testing of the flow cell simulating industrial conditions within tight project deadlines.

RESULTS

The project resulted in a detailed report that provided valuable insights and data about the design and operation of the flow battery cell. Agora Energy is using the research results and the acquired engineering know-how to improve their prototype battery design.

CMC Research Institutes provides facilities to field test, develop and demonstrate early-stage technologies.

The Carbon Capture and Conversion Institute in Richmond, B.C. provides facilities and experts to help innovators de-risk, test and scale-up technologies aimed at reducing industrial greenhouse gas emissions.

- Field test, develop and demonstrate early stage technologies.
- Take your technology from the lab bench to pre-pilot operation.
- Solve design and process challenges during startup and commercialization.
- Validate your technology so you can take it to market quicker.
- Simulate real world conditions with equipment, instrumentation and research expertise at our test facility.

CANADA'S CARBON FUTURE

CMC Research Institute plays a vital role in ensuring Canada's greenhouse gas reduction goals are met:

- In 2017, the International Energy Agency (IEA) estimated that 14% of greenhouse gas reductions by 2060 will have to come from CCUS in order to meet a 2°C pathway.
- Canada is a signatory to the Paris Agreement, with a target to cut GHGs by 30% below 2005 emission levels by 2030.

CMC RESEARCH INSTITUTES

RAPID SCALE-UP & VALIDATION RESEARCH

When Agora Energy began working with CMC Research, they had successfully operated their bench-scale cell in their lab. To move the technology forward on the path to commercialization, they knew they had to switch to a flow cell that could be tested under industrially-relevant conditions. "We had to take the catalyst and test it at a larger scale. There were so many unique requirements, including testing for catalyst robustness during both, forward and backward reactions relevant of the battery charge and discharge cycles, respectively. It was a challenging project," says Dr. Christina Gyenge, CEO of Agora Energy. CMC had the equipment and support staff to collaborate with Agora Energy to test a large flow cell.

ACCELERATING DEVELOPMENT

CMC Research was a key technology partner with Agora Energy to test and de-risk their CO_2 redox flow cell. "The facility was well equipped to find and resolve issues in flow cell design, supporting the improvement and acceleration of very challenging technologies, while saving time and money," says Dr. Gyenge.

The project focused on scaled up testing of the catalyst and trouble-shooting of the flow cell design. Working with the facility and team at CMC Research provided Agora Energy with the results they needed, to inform the next stage of their technology development.

"We gained a wealth of information about scaling up the system, including insights into how to approach new designs. This valuable know-how saved us a great deal of time and money. It was a very beneficial collaboration," says Dr. Gyenge.

THE BIGGER PICTURE

Agora Energy invents and develops technologies to enable the transition to a decarbonized energy economy. Research at a facility like CMC Research, that provides scale-up support and simulation of real-life conditions, is an important part of building a compelling business case for novel technologies. By integrating its work with CMC Research, Agora Energy can now better demonstrate that its CO_2 Redox Flow Battery technology has a meaningful role in the low carbon energy future by linking CO_2 use directly to energy storage.

A decarbonized economy requires innovation and resources to build viable and scalable technologies that can utilize CO_2 and moreover make a business opportunity out of it - like Agora Energy's CO_2 Redox Flow battery.

It also requires that the rate of technology validation and scale up in Canada be accelerated considerably.

Tangible change must happen quickly, and partnerships between innovators and companies such as CMC Research are a vital part of the solution. Such partnerships can considerably accelerate the commercial deployment of innovative Canadian technologies in the CO_2 utilization space. Our future depends on it.