

**Event Summary:**

Carbon and Hydrogen Innovation Showcase powered by CRIN and carbonNEXT

February 2, 2022

9-11 a.m. MT

As Canada's oil and gas industry mobilizes to decrease greenhouse gas emissions, carbon capture and conversion (CCC) technologies and blue hydrogen are globally recognized as key innovations to enable the sustainable development of Canada's hydrocarbon resources.

Through three innovation showcase events in November, 2021, and February and April, 2022, CRIN and carbonNEXT connected oil and gas producers and energy service companies with pre-commercial carbon capture, conversion, hydrogen, and methane decomposition ventures to accelerate cleantech adoption.

This second webinar explored methane decomposition and hydrogen needs in the Canadian oil and gas industry.

**Key Takeaways:**

Jason Switzer, VP of Growth & Capital at Foresight Cleantech Accelerator Centre

- Energy service companies and innovators need to be introduced to each other and engaged in what each other are doing.
- All credible paths to net zero include Carbon Capture Utilization and Storage (CCUS).
- Canada needs more and better tools to get to net zero, and CCUS is this tool.
- Canada is a global leader in CCUS and we need to continue leading the charge.

David Van Den Assem, CRIN Theme Leader, Low Emissions Value Added Products

- CRIN builds community and awareness; we connect the ecosystem and enable the network to thrive.
- CRIN addresses the big environmental and economic barriers that we face as a country.

Jeanette Jackson, CEO, Foresight Cleantech Accelerator Centre

- Foresight is Canada's largest cleantech accelerator.
- To reach net zero, we need everyone in the oil and gas industry to guide the innovator community – what do you need.

Stephen Lougheed, CEO, Carbon Management Canada (CMC)

- Partnership and collaboration between all groups including producers, innovators, investors and researchers is key to reaching net zero.

**Panel Speakers**

- Jan Boshoff (Nu:ionic Technologies) and Brett Wightman (CVS Midstream)

- The panel featured a methane decomposition technology provider, Nu:ionic Technologies, that is gaining traction in the Canadian oil and gas industry, and their project partner CVS Midstream.
- Jan Boshoff:
  - Nu:ionic was founded in 2016
  - It is focused on teal hydrogen
  - They are advancing the utilization of electricity to reform hydrogen are working at commercializing this for use in industrial settings
  - They can produce hydrogen on an industrial scale
  - They eliminate the most polluting elements of gas production
  - They produce hydrogen in greenest way possible; low emission compared to grey hydrogen
  - Nu:ionic will be moving from pilot stage to a commercial scale over the next year
- Brett Wightman - CVS Midstream
  - CVS focuses on creating shared value to help solve social problems
  - Trying to improve their communities through their projects
  - They rely on innovation to advance mid-stream production and to advance the industry
  - They are currently focused on lower carbon intensity initiatives
- How did CVS come to engage with Nu:ionic?
  - Brett stressed the importance of following up with folks you meet on your journey, for example, on panels, at networking events, etc. He met Jan while exploring partners for the CRIN competitions. A connection from Innotech Alberta made the introduction.
  - CVS was looking for a near-to-commercial partner.
  - Jan – Advice to startups: find the space where your company has a natural fit. We networked until we found the perfect fit with CVS.
  - Brett – relationships take a long time to develop, as does technology development. Even though we partner with near- commercial ventures, we always stress to our shareholders and customers that they need to be patient.
  - Brett – when working with startups, you need to be willing to pivot. The technologies don't always work; and sometimes there are better technologies around the corner waiting to launch.
  - Challenges for Nu:ionic:
    - Nu:ionic is in New Brunswick and Jan lives in the US. The companies learned to have a successful virtual working relationship. This has been a benefit and a challenge.
    - The biggest challenge for a startup is to figure out / ensure that opportunities align with technology readiness; the other is to convince companies that they should put their resources behind a technology that is not fully commercialized.
    - Challenges for Nu:ionic moving forward: finding the appropriate demonstration facilities that are well funded.
    - Advice around grant approval – if you don't get funded, you may have to retool and refocus. You will need a Plan B to advance your technology as things change.
  - Challenges for CVS Midstream:
    - Evaluating companies – everyone we partner with has to align with CVS's goals and values.
    - There needs to be good communication because we can't tell what will come in the future – things may change and cause frustrations.
  - Jan – we have piloted at a commercial scale so we are at TRL 5 or 6. We are now looking to finish one scale-up level and then we will be able to deploy a demonstration unit next year.

- Brett – as we look to deploy capital, we are aiming to get to carbon zero very fast. This is for both the economy and the environment.

## **Company Showcases**

### **Kathleen O'Neil – New Wave Hydrogen**

- Currently, to clean hydrogen, steam methane reforming is used or electrolysis – both are expensive and use lots of water and electricity; both are not green and release a lot of CO<sub>2</sub>.
- New Wave Hydrogen, Inc. (NWH2) brings a new energy paradigm to clean hydrogen (H<sub>2</sub>) production via supersonic shock wave heating. The process uses no water, generates no direct CO<sub>2</sub>, is low cost, requires no large parallel infrastructure build-out, and can readily scale to both small, distributed and large, centralized applications.
- Use a wave rotor based solution
- They are highly scalable; have been around for many years
- Funding from ERA, Total, and many other leading Canadian oil and gas companies and universities
- Currently developing a pilot demonstration and a number of patents to produce green carbon

### **Gray Schubak - Ekona Power**

- Developing scalable technology for green hydrogen power
- Their methane pyrolysis solution enables scalable hydrogen production at costs on par with conventional SMR's, while reducing GHGs by 90%
- Have BDC and Baker Hughes, lots of big investors
- PMP Reactor – use the energy in combustion to crack the molecule / raise the temperature
- It is low cost, scalable and mitigates carbon fouling
- Early in development program but have proven their concept. Currently scaling up a prototype / demonstration system.
- Aim to pilot by 2026 and start licensing in 2027.

### **Grace Quan – Hydrogen in Motion**

- Hydrogen In Motion Inc. (H2M) has developed a game changing nanomaterial allowing for high density low pressure (50 bar) hydrogen storage. H2M's smaller, safer, cheaper tanks reduce cost and technical complexity, opening up markets for hydrogen technologies around the world
- For storing and transporting hydrogen
- High costs are a major factor impeding the mass adoption of hydrogen technologies. They aim to address this barrier.

### **Andrew Gillis – Aurora Hydrogen**

- Aurora Hydrogen is developing a low-cost, distributed hydrogen production technology to enable the much wider adoption of hydrogen. They use a novel microwave heating technique to create hydrogen and solid carbon from natural gas without generating CO<sub>2</sub>.
- Novel methane pyrolysis technology
- This is a low cost distribution technology
- No new pipelines required
- No water required

- Currently producing continuous hydrogen at a bench scale
- Reaction model has been verified
- Ready to scale up
- Will be field testing by next year

#### **Important Takeaways**

- The Government of Canada needs to create policy so that hydrogen can be deployed in Canada. We are leaders in this area. We need to take advantage of this status.
- The speed of capital flow needs to increase in Canada.
- More facilitation and support of active pilots in Canada would be beneficial.

#### **References/links for more information:**

- To learn more about hydrogen, check out CRIN's [Low Emissions Value Added Products Theme Area](#)
- [Event slides and recordings](#)