

January 26, 2017

TACKLING ONE OF THE WORLD'S GRANDEST CHALLENGES

Imagine a collaborative global community of innovators and specialists drawn from academia, industry, government and the non-profit sector, working together to solve one of our world's grandest challenges.

Imagine that global community converging on Kingston, Ontario, to cultivate their ideas, identify and transform important technological discoveries, and propel these innovations into the marketplace.

What is imaginable is starting to become reality, thanks to an evolving partnership announced September 7, 2016, between Kingston's international clean-technology accelerator Enviro Innovate and California-based XPRIZE Foundation. The next few years could see teams of technology innovators and entrepreneurs locating to Kingston. At stake is a \$20,000,000 prize to be awarded to whoever among them comes up with the best commercial use for the carbon dioxide removed from industrial emissions. The long-term economic implications for Kingston and South Eastern Ontario could be significant – and perfectly aligned with the interests and goals of the city and its economic development arm, the Kingston Economic Development Corporation.

Created in 1995 by Peter Diamandis, the XPRIZE seeks to encourage innovations that tackle what it refers to as the world's "Grand Challenges" by underwriting lucrative, high-profile contests. Previous XPRIZES have sought to encourage space exploration and the preservation of the oceans.

"A few years ago," says Paul Bunje, principal and senior scientist for XPRIZE's Energy and Environment Group, "we started looking at climate change, in particular at the carbon dioxide emissions that drive climate change." The new NRG COSIA Carbon XPRIZE, sponsored by American energy company NRG, and COSIA, a Canadian energy alliance, seeks innovative answers to a vexing puzzle connected to those emissions. There are methods by which carbon can be extracted from the fossil fuel emissions of gas and coal – indeed, Enviro Innovate has been working in this area for more than 15 years. What to do with that carbon, however, is another question. Sequestration -- storing it in disused mines, for example -- is one answer. The Carbon XPRIZE is searching for others -- anything from building materials to alternative fuels, even to distilled beverages. The goal, says Bunje, is to "demonstrate that there is an opportunity to make money off conversion. This would help foster new industries and encourage others to invest in developing techniques to capture carbon dioxide."

Founded in 2015, Kingston's Enviro Innovate seeks to nurture ideas and new companies working in the clean energy sector, defined in the broadest possible sense -

- everything from CO₂ reduction to green transportation to renewable energy – in part drawing on work done at Queen’s University and elsewhere.

Tom Thompson, CEO of Enviro Innovate, jokes that the collaboration between his clean-tech accelerator and the NRG COSIA Carbon XPRIZE grew out of “a very good bottle of bourbon.” Thompson first met Bunje and Marcius Extavour in April 2016 at a CO₂ technologies conference that both organizations were presenting at in Santa Ana Pueblo, New Mexico. In the course of a four-hour meeting (featuring the aforementioned bourbon) they realized that the Kingston-based accelerator and the Carbon XPRIZE shared similar goals and had real affinities. What ultimately evolved is the desire to work together in a cooperative venture with a number of other collaborators within Kingston’s clean-tech innovation eco-system. (A key component of this coalition will be Enviro Innovate’s new CO₂ Capture and Conversion, Research, Development and Commercialization Centre – one of the first of its kind)

This cooperative venture offers a great potential home to the various groups of contestants working over the next four years to win the Carbon XPRIZE. Those choosing Kingston will benefit in several ways. “For the purposes of the competition,” says Thompson, “contestants will be able to draw on resources and expertise through Queen’s University.” One of Canada’s leading research universities, Queen’s has particular strengths in the field of clean energy. “They will also be able to take advantage of GreenCentre Canada, a national leader in advancing the

commercialization of green chemistry innovations, the DuPont Kingston Technology Centre, Kingston Process Metallurgy, and other companies connected to Enviro Innovate. As well, says Thompson, “We can provide the contestants with a fairly pure supply of CO₂, drawn from a 5-megawatt flue gas stream. This is something we currently supply to a number of companies doing carbon capture and conversion. This will give the contestants the CO₂ they need to convert to whatever they plan to create, in the sort of volumes and under the kinds of conditions they need to demonstrate the real-world practicality of their project. Finally, because these CO₂ conversion technologies also need to demonstrate that they can be economically delivered to the marketplace, contestants can call on expert financial support to help them commercialize their ideas.”

Bunje and Extavour had a chance to check out Kingston’s clean-tech innovation ecosystem first-hand in late August. The two visited Queen’s campus, DuPont’s Front Road Research Centre, and Innovation Park, where they looked in on GreenCentre Canada. “It’s really easy to imagine any team in our competition taking a look at this landscape and saying, Yes, check, check, check, there are services here that I need,” says Extavour. “I was incredibly impressed by the level of essential services I saw there,” says Bunje.

In December, Tom Thompson and Paul Scott of Enviro Innovate, accompanied by Janice Mady from Queen’s University and Seth Baruch, president of California-based

Carbonomics, one of their coalition partners, headed to New Orleans for the second round of the Carbon XPRIZE, where the competitors met with the prize's elite scientific advisory board and judging panel over three days.

“It is clear,” says Thompson, “that a lot of the competitors are feeling challenged with the task they face – and the relatively short deadlines they’re working against. Given that, many realize that our coalition has a lot to offer –GreenCentre Canada, DuPont, KPM and the connections that Janice and her team can facilitate to expand their academic collaborations with Queen’s and other universities. A lot of them were really interested in our partner Carbonomics,” a firm that works to help companies understand carbon trading and become involved in this exciting, fast-growing market.

“By my count,” says Thompson, “we are already engaged with 16 of the 27 competitors. We’re going to be working closely with them to see what they need and how we can help provide it here in Kingston at our centre. This is on top of the handful of other CO₂ capture and conversion projects that we are working on outside of the Carbon XPRIZE competition.

“Ultimately, we hope that the impact of our contribution, both within and outside of the Carbon XPRIZE competition, will go far beyond the critical demonstration of innovative technologies and the selection of just one winner. We really want to inspire transformation, enable new markets, and empower people to be a part of the solution to one of our world’s grandest challenges.”

