Sustainable Chemistry Alliance

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Winter 2011/12 Newsletter

By: Murray McLaughlin

CANADA:
A Destination for Bio-based Industry

Here we are in 2012 and 12 years into the 21st century, the century encompassing a shift to the bio-economy and where we are at in the movement to a Green and Sustainable Technology initiative in Canada. This whole sector has been driven by environmental, energy security, economic and regulatory forces. On a global basis, it has attracted investors and government support in the millions.

In Canada, we have seen the movement to biofuels, ethanol and biodiesel over the last 10 years, and that movement will continue to grow over the next 10 years, but with some shift to the use of cellulosic biomass (agriculture and forestry).

From a research and development standpoint beyond biofuels, Canada has been stellar in biomaterials, bio-process efficiencies and alternative crops. In 2011, we also have seen the entry of Rentech and BioAmber into the Canadian market with a commercial focus. These two companies have moved Canada into a commercial scale of bio-based chemicals, and 2012 should see an expansion to more companies moving to commercialization.

We have seen EcoSynthetix, a bio-based latex polymer business, establish their head office and research base in Ontario in early 2011 and do an IPO in August for $100 million.

In forestry, we saw the formation of FIBRE, a network of 8 research networks, creating an overall network of several hundred researchers and most Universities across Canada. This puts Canada in a good position to maintain a leadership position in forestry and effect change to new technologies.

Within SCA, we have completed 11 investments as of December 2011 including EcoSynthetix and BioAmber. More recently, investments were completed with Vive Crop Protection and $S4C0_2$, both outlined in this issue. With committed funds of $5.2 million from SCA, the companies have seen actual funds invested at that point in time of approximately $140 million. The benefits have been 200 plus direct jobs created and companies moving toward commercialization in Canada.

This effort has led to BIC establishing an international conference which will be held March 26-28, 2012 (in Sarnia, ON) and is titled Bringing "Bioproducts to Market: Overcoming Risks to Commercialization". The conference is a must attend for those involved in bio-based chemicals and bioproducts.

2012 will be building off a good year in Canada's bio-economy, as the foundation was established in 2011. SCA and BIC look forward to helping build off the foundation this year.

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The Sustainable Chemistry Alliance is a not-for-profit organization established in 2008 to promote growth and prosperity by fostering and supporting innovation, development, commercialization and related business activities and projects in the area of green and sustainable chemistry. SCA is supported by the Bioindustrial Innovation Centre, a Centre of Excellence for Commercialization of Research with funding from the Government of Canada.

ALSO IN THIS ISSUE:

SCA Investment:
Vive Crop Protection Formulations Aim to Reduce Environmental Impact

The SCA's recent investment in Toronto-based **Vive Crop Protection** will help the company bring its innovative products to market. Vive's formulations are designed to give producers the ability to increase crop yields safely while reducing the use of petroleum-based additives in crop protection products.

"We are looking forward to working with Vive as they continue to develop their technology for different pest and weed uses within the agricultural sector and move products into the marketplace over the next few years," said Dr. Murray McLaughlin, president and CEO of the SCA.

Traditional crop protection products use a wide range of formulants, surfactants, emulsifiers and other chemicals around the active ingredient to help with delivery into the plant or other target. Vive's patented delivery mechanism replaces this wide range of chemicals by encapsulating the active ingredient inside a tiny ball. These small capsules are made out of biodegradable or bio-inert polymers.

Although Vive's primary focus is the crop protection industry, its technology is applicable to wide range of active ingredients for other industries such as consumer products, industrial chemicals and pharmaceuticals.

Keith Thomas
CEO of Vive Crop Protection

"Getting an investment from the SCA provides tremendous validation of our technology for the crop protection industry, from both a technology perspective and a sustainability perspective," said Keith Thomas, Vive's president and CEO. He said the depth of experience in SCA's board of directors will be important to the company in the future. "We will have access to a network of contacts and the experience that they bring as we build our company."

Thomas said SCA's investment, along with funds from other investors, will help Vive to build on its successful trial experience and development agreements with large well known chemical companies around the world. "Our goal is to convert those development agreements into commercial agreements in 2012 and ready our products for the marketplace."

Vive has formulated about two dozen active ingredients so far. Its technology platform addresses challenges such as hard water problems and has the potential to reduce the amount of water required for application. The formulation can be used to modify the solubility for soil applications and to keep the products from entering the water table.

"What we like about the crop protection market is that there is a very stringent regulatory regimen that you have to go through before the product gets to market," Thomas said. "It takes time but we feel that it's a safer product when it gets out there."

Vive was recently nominated for a 2011 Agrow Award in the category of best formulation innovation of agrochemical or biopesticide products with emphasis on innovation that could lead to improved product efficacy through enhanced delivery or targeting, improved user safety or reduced environmental impact. In 2010, Vive received the Frost & Sullivan 2010 North American Technology Innovation of the Year Award for its unique encapsulation technology to synthesize particles.

A privately held company based in Toronto, **Vive Crop Protection** researches and commercializes formulations of active ingredients for crop protection and other applications. Founded out of the University of Toronto's chemistry department in 2006, Vive now has two locations in Toronto and one in Guelph. The company has 24 employees and has collaborated with universities such as Guelph, McGill, Western Ontario and Alberta. It has clients in the United States, Europe and India.

SCA Investment:
$S4CO_2$ Inc. Transforms Waste Gas into High Value Co-products

Solutions4CO_2 Inc. is looking at plant locations in Sarnia-Lambton and aims to locate its demonstration facility and global headquarters here in the near future. Currently based in Toronto, the company has received joint financial support that includes the Sustainable Chemistry Alliance and investment firm Macquarie Private Wealth Inc.

"This builds on the recent decision by BioAmber, which also received SCA investment, to locate is succinic acid plant here in our growing world-class hybrid chemistry cluster," said Dr. Murray McLaughlin, CEO and President of the SCA. He said the alliance worked closely with the Sarnia Lambton Economic Partnership and the SCA's government and industry partners to attract $S4CO_2$ to the region.

Formed in 2010, $S4CO_2$ is an Ontario corporation with the objective of becoming the carbon dioxide (CO_2) capture and infusion industry standard for CO_2 emitters and users. $S4CO_2$ focuses on designing, building, operating and maintaining industrial solutions to capture waste gas streams such as CO_2, and process these streams into value added co-products.

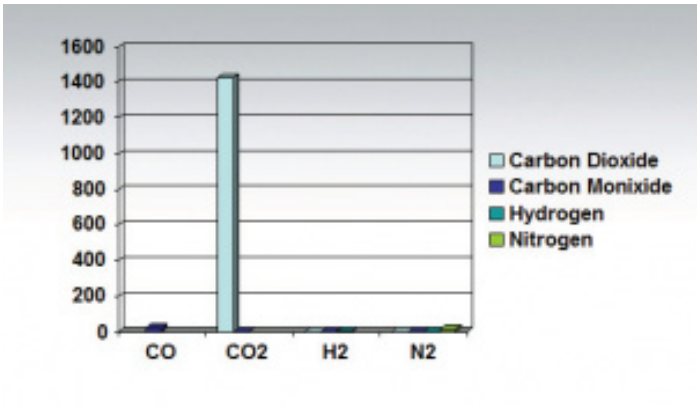
The company says the Capture and Infusion System separates over 95% of the GHG emissions (CO_2, NO_X, SO_X) from coal fired power plants, steel mills, petrochemical refineries and cement plants and effectively infuses these gases in microscopic portions into water to be utilized to grow micro and macro algae for biofuels, Biochemicals, nutraceuticals, pharmaceuticals and animal feeds.

It is estimated that over 31 billion tons of carbon dioxide are emitted worldwide annually. Current efforts to reduce these levels are highly dependent on finding other means of utilizing the captured CO_2 beyond enhanced oil recovery or "parking" it at the bottom of the ocean or in rock formations. $S4CO_2$ focuses on cost effectively capturing CO_2 from post-combustion flue gas and utilizing that CO_2 in the process of growing of algae for the extraction of high value added co-products as a viable long-term solution for the environment.

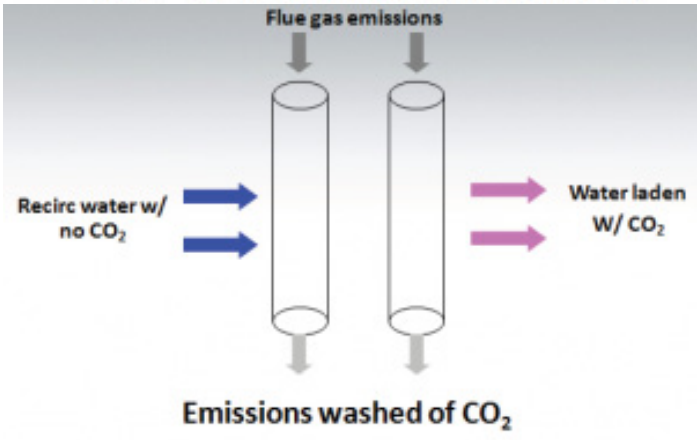
Douglas Kemp-Welch, CEO of $S4CO_2$, said the experience, expertise and networking capability available through the SCA was instrumental in his company's decision to locate its global headquarters and research and development operations in Sarnia. "The combination of the SCA and the economic development office had a direct impact on our decision to choose Sarnia over many other locations in Canada for our demonstration facility. Given that Sarnia area companies produce some of Canada's CO_2 emissions, it's also a natural site for deployment of our technology."

Douglas Kemp-Welch
CEO of Solutions $4CO_2$

He added that the SCA has helped to facilitate his company's connection with the major chemical companies in the region. $S4CO_2$ "bolts its technology" to the technology of other companies, which are either a source of CO_2 or a potential customer for its downstream products.



The 1st 'key' is differing gas solubility in water



Emissions washed of CO_2

$S4CO_2$ is a developer of exclusive industrial scale CO_2 capture and use solutions using gas infusion technology. Gas infusion extracts CO_2, NO_2 and SO_2 from flue gas and biogas and efficiently mass transfers high concentrations of the extracted CO_2 into water. Currently working out of offices in Toronto, the company is planning to locate both its national headquarters and demonstration plant in Sarnia.

BIC International Conference March 26-28, 2012:
Assessing Risks to Commercialization of Biochemicals and Bioproducts

The international conference of the **Bioindustrial Innovation Centre** in Sarnia-Lambton will focus on Bringing Bioproducts to Market - Overcoming Risks to Commercialization. The conference, to be held at the Holiday Inn in Sarnia (Point Edward) on March 26-28, allows participants to share their experiences and ideas with industry, government and institutional experts from around the globe.

"This is a also a unique opportunity for international visitors to get a first-hand look at Canada's emerging hybrid chemistry cluster right here in Sarnia-Lambton and share up-to-date information about best practices in the bio-economy," said Murray McLaughlin, president and CEO of the SCA and executive director of the BIC. The SCA is supported by the BIC, a Centre of Excellence for Commercialization and Research with funding from the Government of Canada. SCA is a strong supporter of this conference and many of our investment companies will be present.

Canada is one of the few countries in the world that can support a large-scale bio-economy due to its abundant and sustainable biomass resources. Existing and emerging companies are aggressively developing early stage technologies that have the potential to successfully move forward to the commercialization stage.

Sessions 1-4 will be held on March 27, followed on March 28 by the 5th session, conference wrap-up and tour of the BIC and Sarnia-Lambton's hybrid chemistry cluster. One of the keynote speakers is Marc Verbruggen, President and CEO of NatureWorks LLC.

In addition to the session chairs, scheduled speakers at the conference include: Nicolas Bertrand, Project Manager, Consortium for Research and Innovations in Industrial Bioprocesses (CRIBIQ): BioAmber; David Bressler, Biorefining Conversions Network, University of Alberta; Lynn Buchanan, Vice President, Industry Relations for Biotech Canada; Glyn Chancey, Executive Director, Red Tape Commission; Jim Grey, Chair, Canadian Renewable Fuels Association Board; Sam Kanes, Principal, Fossil to Fuel Bio Advisors; John van Leeuwen, Chairman and CEO of EcoSynthetix Inc., John M. May, Managing Director, Stern Brothers & Co.; Brenda McIntyre, Senior Policy Advisor, Agriculture and Agri-Food Canada; and Gord Surgeoner, President, Ontario Agri-Food Technologies. Stay tuned as we finalize the program in January.

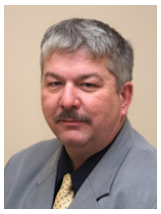
To register for the conference or obtain up to date information on the agenda, speakers, accommodations and sponsorship opportunities visit the **BIC International Conference page**. To register directly click here: **registration form.**

For further information, contact Mary Prendiville, Manager of Business Development at (519) 383 8303 ext. 238 or **mprendiville@researchpark.ca.**

Session 1:
Business Development Acumen/Market Entry and Development, chaired by Dave Smardon, President and CEO of BioEnterprise.

Session 2:
Improving Access to Technical Expertise, chaired by Neil Ross, CEO of Ross Scinergy.

Session 3:
Financing/Availability of Incentives, chaired by Murray McLaughlin, Executive Director, BIC and CEO/ President of SCA.



Session 4:
Challenges of Feedstock Supply and Logistics, chaired by Don McCabe, Vice President of the Ontario Federation of Agriculture.

Session 5:
Regulatory Approvals/Bureaucratic Challenges, chaired by John Kelly, Vice President of Erie Innovation & Commercialization.

BIOINDUSTRIAL INNOVATION CENTRE

Located the University of Western Ontario Research Park's Sarnia-Lambton Campus, the **BIC** focuses on helping Canada become a globally recognized leader in taking sustainable feedstock, such as agricultural and forestry by-products and wastes, and turning these renewable resources into energy and value-added chemicals for use in applications ranging from construction to automotive parts. BIC is funded through a combination of revenues and investments from the private sector and government, including $15 million from the Government of Canada's Centre of Excellence for Commercialization and Research program.

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