

SusChemAlliance



By: Murray McLaughlin

The Entrepreneur and Technology - The Road Less Travelled

I recently read through a book by Denzil J. Doyle titled : “Making Technology Happen - How to find, exploit and manage innovative products, services, and processes”. It is a handbook that all entrepreneurs (the person with an idea that he or she thinks can be turned into a successful business) should have in their reference list. Denzil is an entrepreneur in his own right and is known as the archangel of Silicon Valley North in Ottawa.

I thought a few excerpts from “Making Technology Happen” would be of interest to you, as readers of our newsletter.

- The rationale for capturing any share of any market must be clearly spelled out.
- In all too many cases, there is a complete lack of coordination between the person who generates the financial data and the one who generates the marketing data.
- Most conventional venture capital companies are more prepared to consider opportunities that require large amounts of capital than the smaller deals.
- More new ventures fail because of poor marketing than because of poor engineering or poor financial management.
- Most entrepreneurs underestimate the importance of forecasting.
- Pure research can be just as productive as applied research in the development of new products.
- Patents are becoming less and less effective as the pace of technology quickens.
- It is not uncommon for entrepreneurs to underestimate the current market penetration, especially when entirely new products are being brought to market.
- A good board of directors is as important as a good management team, a good business plan and good investors.
- Given a choice of being in too many markets or too many technologies, I will pick too many markets any time.
- Forecasting is the most important lesson to learn and (difficult to get right) and the second most important lesson is that it takes a great deal more than R and D to create wealth.

I trust these excerpts get you interested in the challenges of Making Technology Happen. At BIC and SCA we are positioned to assist entrepreneurs through the challenges and on to the Road to Success in the area of green and sustainable technologies.

Sustainable Chemistry Alliance

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KmX Starts Production at Pilot Plant in Sarnia

With production startup this fall at **KmX Corporation's** pilot plant in Sarnia, CEO Isaac Gaon says the company's membrane technology has attracted significant interest from other companies in the region.

"The company's strategic direction is to provide membrane-aided pathways in the manufacture of biofuels, biochemicals and bioplastics," Gaon says. "Our process can be used in the production of biobutanol, and cellulosic ethanol." KmX technology is designed to reduce operational costs and complexity for any manufacturer of fermented chemical products.

Gaon says the financing support from the Sustainable Chemistry Alliance provides leverage in the process of attracting other investors. The company is hoping to accelerate the pilot demonstration process at the Western Sarnia-Lambton Research Park over the next several months in preparation for development of a major production facility in the region. KmX is currently attempting to add about \$25 million in additional financing to allow it to move to the next phase.

In addition to the proximity of its pilot plant to potential industrial customers in the region, the plant is easily accessible from the company's head office in Oakville, Ontario.

About nine people are currently working at the pilot plant, with additional company personnel coming to the plant during the week.

Membrane Technology

The pilot plant will demonstrate how KmX's hydrophobic and hydrophilic membranes can cost effectively capture and dehydrate the small volume of post fermented alcohol molecules in the fermentation broth. Today, this process is carried out using energy intensive thermal processes, which due to both azeotropic and inhibitor conditions in the broth are extremely complex. The combination of hydrophilic and hydrophobic membranes that operate at the molecular level are designed to significantly reduce both energy consumption and complexity.

The pilot will also demonstrate KmX's novel (non enzymatic or acidic) hydrolysis process and show how the hydrolyzed sugar can be taken to a pre-crystalline state by using KmX's new sugar enrichment process. This membrane-aided process has the potential of changing the dynamics regarding the distances that feedstocks can be utilized economically. By converting the feedstock to sugars onsite where the feedstock resides and decoupling the hydrolysis from the downstream biorefining process, sugar-rich hydrolysate rather than bulky low sugar biomass can be shipped from feedstock spokes to the biorefinery

hub at significantly reduced shipping costs.

The dehydration step for biobutanol (both n-butanol and isobutanol) is facilitated by a naturally occurring phase change that takes place at approximately 10% butanol and 90% water, assuming the absence of inhibitors which are removed by the membrane. As a result, the bottom water phase can be simply decanted while the top butanol phase containing approximately 3% to 5% water can be dehydrated to anhydrous butanols using the hydrophilic membrane, saving an estimated 50% or more in energy consumption.

Gaon, who presented at the SCA annual meeting in June, says a past objection to pervaporation technology that energy savings of 50% and more came at a higher capital cost compared to conventional thermal technologies is no longer the case. "The capital cost of pervaporation solutions today are either similar or often less than thermal systems on a fully installed basis."



Isaac Gaon
CEO KmX Corporation



Operator Jake Authier at KmX pilot plant



KmX Corporation is a membrane-aided cleantech company providing separation solutions for many industries, including pharmaceutical, chemical, biotechnology, petrochemical, mining, and waste management industries. The privately held Ontario company was founded in 2005.

Woodland Biofuels Targets Early Results from Its Pilot Plant

Benefitting from its pre-constructed modular design, assembly of the demonstration plant of Woodland Biofuels rapidly came together during the late summer and early fall at the Western Sarnia-Lambton Research Park. All equipment was connected in September and October with commissioning activities in September.

Doug Gray, VP Engineering, Construction and Project Implementation, says Sarnia is an “ideal location” for demonstrating Woodland’s technology at the pilot-scale level and possibly for future research activities. He says the Sustainable Chemistry Alliance was an early investor in Woodland, and has provided an ongoing supportive environment for pilot plant operations.

“As early as January, 2013 we should have some results from our pilot facility that we move forward with,” Gray says. “The experience gained from the demonstration plant operations will be used to optimize the design and operations of commercial-scale plants.” Commercialization efforts are led by Woodland CEO Greg Nuttall.



Douglas Gray
VP Engineering,
Construction and
Project Implementation

The demonstration plant uses patented chemical process technology to produce sustainable fuels from virtually any type of biomass, including wood waste, agricultural waste and municipal waste. The technology generates no toxic emissions and eliminates the need to use food products, such as corn, to produce cellulosic ethanol.

The pilot plant is expected to demonstrate Woodland’s goal of being the lowest cost commercial producer of automotive fuel in North America. Woodland’s plants are expected to produce about 130 gallons of ethanol per dry tonne of feedstock and be approximately 70% more efficient than competing technologies.

Woodland’s business model involves both building its own plants and licensing others to build plants using Woodland’s technology. This dual approach is intended to facilitate the accelerated adoption of Woodland’s cellulosic ethanol technology.

The commercial site selection process is primarily driven by fibre availability, cost and stability. In terms of energy requirements, Woodland’s process can be fired by biomass and can generate much of its own power requirements, thereby providing significant flexibility in plant location. In addition, other cellulose processing technologies require heating by natural gas and, therefore, are vulnerable to volatile gas prices.

Unlike conventional fermentation and chemical manufacturing plants, Woodland plants are smaller scale, modular units that can be built in a wider range of suitable locations, with a scale to suit

the particular location.

Gray says the company’s technology will be of significant interest to the forestry products industry and an ideal location for a commercial-scale facility would be near a feedstock supplier.



Woodland Biofuels pilot plant in Sarnia



WOODLAND BIOFUELS INC.

A privately owned company, **Woodland** has developed and patented a low-cost process technology to produce cellulosic ethanol from waste biomass. Woodland’s technology eliminates the use of food to make ethanol by converting any kind of biomass (wood waste, crop waste, and more) into ethanol or other high value products. Its strategy is to build, own and operate cellulosic ethanol plants, together with pursuing selected licensing opportunities. Woodland is in the investment portfolio of the Sustainable Chemistry Alliance. In August, SCA board of directors’ member Bill White joined Woodland’s senior management team as Chief Operating Officer.

BioAmber On Track for Plant Commissioning in 2014

With an initial capacity of 17,000 metric tons of bio-succinic acid, **BioAmber** is on track for commissioning of operations at its new plant in Sarnia in 2014.

“We have begun early works on the site in Sarnia including hooking up to the water and sewer system under Vidal Street,” says the company’s Executive Vice-President Mike Hartmann.

The company plans to expand capacity at the Sarnia operation to 34,000 metric tons of bio-succinic acid, with a 23,000 metric tons bio-based 1,4-butanediol (1,4 BDO) plant planned for late 2014.

The \$80 million project is being constructed at the LANXESS Bio-Industrial Park in Sarnia. The site is located in a large petrochemical hub with existing infrastructure that facilitates access to utilities and certain raw materials and finished product shipment, including steam, electricity, hydrogen, water treatment and carbon dioxide.

This is the first facility to be built under BioAmber’s joint venture agreement with Mitsui & Co. The companies intend to build additional facilities in Thailand and either the United States or Brazil.

BioAmber currently manufactures its bio-succinic acid in a facility using a commercial scale 350,000-litre fermenter in Pomacle, France, which the company believes to be one of the largest bio-based chemical manufacturing facilities in the world.

In September, Inolex, a developer of innovative ingredients for the personal care and cosmetics industries, launched a new range of 100% natural and sustainable emollients using bio-based succinic acid from BioAmber. Other developments at BioAmber in 2012 have included an agreement with Evonik Industries on long-term cooperation for the development and manufacturing of catalysts for making BDO, and a BIOTEC Canada Gold Leaf Award for Early Stage Company of the Year.



Sketch of Bioamber’s Succinic Acid Facility

**Sustainable
Chemistry Alliance**
Growing the future naturally

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.
www.suschemalliance.ca



The company’s proprietary technology platform combines industrial biotechnology, an innovative purification process and chemical catalysis to convert renewable feedstocks into chemicals that are cost-competitive replacements for petroleum-derived chemicals. BioAmber currently sells its first product, bio-succinic acid, to customers in a variety of chemical markets in connection with its product and market development efforts.