



## **GERMAN-CANADIAN CENTRE FOR INNOVATION AND RESEARCH**

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### **Company Profiles - Alberta-Germany Collaboration Fund Symposium in Germany, November 2013**

#### **A) Cleantech:**

##### **1) Boreal Laser ([www.boreal-laser.com](http://www.boreal-laser.com)):**

Boreal Laser provides laser gas detection solutions for environmental and process monitoring and for safety applications. Important applications are line-of-sight laser gas sensing along the perimeters of toxic gas sources in refineries, petrochemical plants and oil & gas processing facilities. Boreal Laser also supplies systems for cross-stack and duct monitoring and for leak detection. We also supply vehicle mounted natural gas leak sensors that may be used with either a helicopter or a ground vehicle to pinpoint pipeline leaks. The company exports most of its production, having sold systems to over 40 countries. In particular, Boreal Laser has partnered with the US EPA, Agriculture and Agri-Food Canada, and other industries to develop large area fugitive emissions mapping and measurement technology. For these mapping applications the company's near-infrared GasFinders are combined with precision-motorized scanners. Boreal Laser is currently developing a new laser gas analyzer technology that will significantly enhance the capabilities of Boreal Laser products. Both DFB lasers and new mid-infrared Quantum Cascade Laser technology will be used with the new analyzer.

#### **Potential Partners Requirements:**

Boreal Laser's new analyzer technology will give us the opportunity to increase both applications and markets. We hope to partner with a company that shares our interest in trace gas sensing, will assist Boreal Laser with the development of new applications of interest to the partner, and assist us with bringing the applications to market. Of particular interest to Boreal Laser are the detection of methane and hydrogen sulphide and the application of portable sensors to the detection of natural gas leaks.

## 2) Western Hydrogen ([www.westernhydrogen.com](http://www.westernhydrogen.com)):

Western Hydrogen Limited is a Canadian company, based in Calgary, Alberta dedicated to the development and commercialization of a new hydrogen manufacturing technology called Molten Salt Catalyzed Gasification (MSG). Depending on operating conditions, the Molten Salt Catalyzed Gasification process can produce hydrogen, synthetic natural gas or synthesis gas at high pressure from any carbon containing material and water. The MSG process is projected to have significant economic and environmental advantages over current hydrogen manufacturing technologies including lower hydrogen supply costs, maximum feedstock flexibility, significantly lower GHG emissions, high pressure hydrogen production and lower cost CO<sub>2</sub> capture.

Western Hydrogen is in the final stages of commissioning and startup of a 200,000 scfd pilot plant in Ft. Saskatchewan, AB with first hydrogen expected in late August or early September 2013. The pilot plant will be tested on multiple feedstocks in succession to display the flexibility of the MSG process: asphalt will be used as a proxy for the heaviest hydrocarbon feedstocks, natural gas for gaseous hydrocarbons and a biomass feedstock such as glycerol or algae for renewable hydrogen production.

The feedstock flexibility and projected scalability of the MSG process allows for multiple target markets, including:

- hydrogen supply for upgrading, refining and other petrochemical processes;
- hydrogen supply for transportation including fuel cell vehicles, forklifts and fleets;
- production of synthetic natural gas;
- production of synthesis gas for liquid fuels via Fischer-Tropsch
- asphaltene gasification and;
- production of renewable hydrogen and power when using renewable feedstocks.

### Potential Partners Requirements:

Western Hydrogen is looking for access and exposure to the companies involved in the future German hydrogen economy. These companies will be involved in the full spectrum of the hydrogen economy from production of renewable feeds used in hydrogen production to the end users of zero carbon hydrogen or electricity.

## 3) TerraVerdae BioWorks Inc. ([www.terraverdae.com](http://www.terraverdae.com)):

TerraVerdae BioWorks is an Industrial Biotechnology and Bioprocessing firm developing a bioprocess that converts waste-derived single carbon (C<sub>1</sub>) feedstock (i.e.: Methanol, Methane) into sustainable biomaterials and bio based chemicals. This approach provides alternatives to petrochemical-based and agricultural-based processes for the production of sustainable materials and chemicals while reducing greenhouse gas emissions and avoiding competition with the agri-food industry for feedstock and land use. The company also offers contract process development and optimization services for bioproduct development.

TerraVerdae is currently optimizing scale-up of its lead natural thermoplastic biomaterial (PHA) product to commercial scale. Polyhydroxyalkanoates are natural biodegradable thermoplastics and precursors for a range of next generation bioplastics and biocomposites. The company is also developing a broader portfolio of biobased chemicals and high-value bioproducts targeting value-added applications in the Industrial Chemicals, Agricultural, Horticulture and Flavors & Fragrances Markets.

Core capabilities and competencies are:

- Metabolic engineering and systems biology.
- Bioprocess optimization, scale up and down-stream-processing.
- The company's capabilities include state of the art fermentation and DSP infrastructure up to 2,000L capability.
- High efficiency protein expression system for the production of challenging and scarce proteins.

Potential Partners Requirements:

- Biopolymer development (blending & compounding)
- Feedstock Opportunities - sources and utilization of waste methanol, methane, etc.
- Other C1 organisms and novel bioproducts
- Market channels

4) Simple Solar Heating Ltd. ([www.simplesolar.ca](http://www.simplesolar.ca)):

Simple Solar Heating Ltd is based in Calgary, Alberta, Canada. We design, manufacture and install solar heaters for cold-climate residential applications.

Our specialty is integrating solar heat into other heating systems including electric, gas, wood, geo-exchange and bio diesel heating systems. We ensure that mechanical integration be completed in a 'simple' fashion true to our company name.

We also work with our clients to provide innovative solutions that architecturally integrate the solar collectors within the building's style.

Our unique approach provides solar heaters that will not overheat and will achieve up to 100% solar fraction.

Our patented Freedom Won solar heater is unique providing a lower-cost, more reliable and more efficient solar heater than the established industry.

Feature	Benefit
Thermostatic controls	Highly reliable without electronic controller, sensors and relays
Integrated photo-voltaic module	Not vulnerable to loss of grid power Requires no external energy supply
Automatic excess-heat dissipater	Not affected by high sunshine / low demand Achieves very high solar fraction

Simple Solar provides solar heating systems for domestic water heating, space heating as well as pool and hot tubs. We have expertise in solar combi-systems using one collector array for two or more heating applications.

All our heating systems are designed for simplicity, reliability and low cost. From our base in Calgary we supply solar heaters to new home builders, alternative energy contractors and mechanical engineering firms across Western Canada.

Our technology is being used in numerous solar heaters providing clean, renewable heat for families and businesses without the expense and pollution of conventional heating methods.

Potential Partners Requirements:

We are looking for strategic partnerships with heating system manufacturers that are interested in access to 'simply the best' solar heating technology. Our technology is ideal for cold climate solar heating projects where reliability, cost efficiency and high solar fraction are desired.

The German company should be in the business of providing heating systems and should be involved with solar heating already, or want to become involved with solar heating. The ideal partner will be a supplier of heating systems with distribution throughout Europe, good marketing and engineering resources and value innovation.

5) May Ruben Thermal ([www.may-rubentechnologies.com](http://www.may-rubentechnologies.com)):

Binary Fluid Ejector (BFE) Description

Before widespread electrification of the U.S. in the 1930's, ejector refrigeration was used to make ice and provide industrial process chilling. Ejector systems consist of the same components as conventional refrigeration – an evaporator (where heat is absorbed) and a condenser (where heat is given off). However, instead of a complex electromechanical compressor keeping the refrigeration fluid cycling, a continuous flowing gas phase ejector served this function. An ejector is a simple T-intersection where the low energy refrigerant gas is entrained and compressed by a high energy jet of steam from a boiler. These systems were simple, cheap, and reliable but suffered from such poor thermal efficiency, they were eclipsed by electromechanical systems.

MRTS has developed and patented a new class of ejector system that will increase the efficiency of prior art by 300%, making them, for many applications, a better alternative than today's electromechanically driven heat pumps. In most regions, significant savings can be achieved by switching the drive energy from electricity to natural gas. The greatest environmental (and often economic) solution is to use higher temperature renewable thermal energy (waste heat or solar thermal) to drive the system, turning the emissions to zero and making the energy cost just a capital cost.

BFE can use thermal energy to do useful work such as space heating/cooling, or process heating/chilling. Heat pumps reduce the total energy required for industrial or

agricultural drying or for distillation of liquids, including desalination. Of the many potential applications, there are two opportunities that MRTS is targeting for market entry: ground source heat pumps for residential heating/cooling and industrial waste heat recovery. MRTS is working with the highly respected Gas Technology Institute (GTI) of Chicago to build and test a BFE commercial prototype system.

Potential Partners Requirements:

MRTS is looking for collaborative partners for:

- Assistance in fluid selection or formulation, either from a research group or an industrial chemical supply company, to optimize system performance. MRTS has developed a deep understanding of the impact of fluid parameters on system performance. The basis of BFE technology is maintaining two fluid components that combine in the ejector, then separate in a fractionating condenser, with one fluid completing the reverse Rankine refrigeration cycle (evaporator, ejector), the other completing the forward Rankine power cycle (boiler, ejector). Each fluid will likely be an organic fluid. For the power cycle, the ideal fluid has Low Heat Capacity ( $C_p$ ), Low Ratio of Specific Heat ( $\gamma$ ), and High Molecular Mass, for the refrigeration cycle, the ideal fluid has High Phase Change Enthalpy, High Heat Capacity ( $C_p$ ), High Ratio of Specific Heat ( $\gamma$ ) and Low Molecular Mass. Saturation pressures will play a critical
- Assistance in Commercial Product Development for Heat Pump Applications. MRTS is seeking manufacturers of heat pumps, heat exchangers, solar thermal collectors, etc to be part of a collaborative development effort.

6) HIECO ([www.hieco.ca](http://www.hieco.ca)):

High Impedance Electroporation (HIE) is a non-thermal, non-chemical method for pasteurizing liquids. HIE technology employs a dielectric barrier to insulate the electrodes from the fluid under treatment, thereby curing the problems of traditional electroporation: electrochemical reactions, free radical production, electrolysis, electrode degradation, and excessive waste heat production.

HIE is a solid state device consisting of a substrate panel pierced by many microfluidic channels, each containing a pair of electrodes coated with a thin film dielectric material. Modelling results indicate this device should reduce the energy cost of thermal pasteurization by over 90% and capital cost by 75%. Past studies of electroporation indicate a much higher preservation of nutrients and flavor versus thermal pasteurization. Applications include milk, beer, wine, juices, sports drinks, soups, teas, liquid eggs, oils etc. In addition to liquid foods there are industrial applications, such as municipal waste water treatment, and pharmaceutical opportunities such as microfluidic electroporation for “lab on chip” diagnostics and potential continual flow transvection. Medical opportunities include treatment of blood plasma and even a

microfluidic implant device for continual bacterial treatment of live blood within the body.

Potential Partners Requirements:

HIECO is looking for collaborative partners for:

- Assistance in nanomaterial selection and deposition. To achieve the highest possible efficacy and level of performance, our technology calls for state-of-art thin film capacitors with few electrically active defects and low leakage current. Specifically, we are interested in advanced dielectric materials that can be deposited in a very thin layer (possibly as thin as 1 nm, and not thicker than 1  $\mu\text{m}$ ) onto borofloat glass, which limits the deposition processes to low temperature ones ( $T < 450 \text{ C}$ ). Maximum post processing temperature should be 200 C. These thin films are required to have a high value of static relative dielectric permittivity ( $k = 10$  and higher) and a high breakdown limit ( $E > 5 \text{ MV/cm}$ ), with the practical rule that the product  $k \times E$  should be above the value of 70 MV/cm. Furthermore, candidate materials should demonstrate high volume resistivity and be good ionic barriers and poor electron ejectors, as well as chemically stable.
- Product development for potential market segments and applications – liquid foods, industrial, municipal or pharmaceutical or medical.

**B) ICT:**

**1) MRF Geosystems Corporation ([www.mrf.com](http://www.mrf.com)):**

MRF has been in business since 1992 and specializes in Geographic Information Systems (“GIS”) software development, systems integration, data conversion, and consulting services. MRF has many Customers, such as:

- Municipal governments
- Provincial governments
- Federal governments
- Oil and gas
- Utilities
- Forestry
- Agriculture
- Transportation

MRF GIS Technologies and Products:

- MRF Clean 2D : Cleans 2D vector maps to correct digitization errors (over-shoots, under-shoots, duplicates, near duplicates, etc.) or to synchronize data from

different sources. This product has been licensed to more than 6,000 users in over 40 countries.

- MRF Clean 3D: Cleans 3D vector maps to correct digitization errors (over-shoots, under-shoots, duplicates, near duplicates, etc.) or to synchronize data from different sources. This product has been licensed to more than 6,000 users in over 40 countries.
- MRF Overlay: Performs spatial overlay analysis. Can process points, lines, and polygon layers. Can find point-in-polygon, line-in-polygon, polygon intersections, etc.
- MRF Buffer: Creates buffer zones based on input points, lines, and polygons.
- MRF Network: Performs network analysis to determine shortest path, quickest path, etc.
- MRF HTML5 Map Server: Serves vector maps to various browsers on the desktop and smart phones.
- MRF GISNet: Supports web-based vector map editing.
- MRF Field GIS: This is a Windows desktop application with a GIS website-like user interface. Very user friendly. No formal GIS training is required.

Some of the MRF products have been OEMed by Intergraph Corporation and Safe Software Inc.

#### MRF GIS Solutions:

- Municipal GIS Website: Integrates with accounting and assessment systems. Supports measurement, redlining, search, query, book mark, printing maps into PDF, and emergency notification.
- GIS integrated with Automatic Vehicle Location (“AVL”): Live display of vehicle locations on custom vector maps. Users can access the maps from the desktop or smartphones. MRF can refresh the vehicle locations every second.
- GIS integrated with Asset Management, Document Management, and e-commerce: Asset Management using Maximo, Hansen, or RoadMatrix.
- Document Management using FileNET, Documentum, Hummingbird, etc.
- E-commerce using Microsoft Commerce Server and PayPal.
- GIS integrated with Wildfire Management Decision Support System: Wildfire growth model uses Prometheus. Supports fuel type update. Support suppression methods such as water bombers, bulldozers, and ground crew.
- GIS integrated with Road Video Serving Application: Road videos can be linked with each road. User can click on a road and the road video will play from that point. While the video is played, the vehicle location on the map will be updated.

- MRF Field GIS for weed/asset inspection: MRF supports Algiz 7 (rugged field computer running Windows 7) and Lenovo Helix (semi-rugged computer running Windows 8).

Potential Partners Requirements:

- Has proprietary software products
- Offers systems integration services
- Has well established customer base
- Has a strong research and development team
- Has a need for advanced GIS capabilities
- Can collaborate with MRF to develop new products/processes/solutions which have great commercial potential

2) Preciseley Microtechnology Corp. ([www.preciseley.com](http://www.preciseley.com)):

Founded in 2006, Preciseley Microtechnology Corp. is an independent fab-less MEMS product company located in Edmonton, Canada at the NRC National Institute for Nanotechnology's Innovation Center.

With an extensive background in MEMS design and manufacturing developed according to the rigorous standards of the telecommunications industry, Preciseley has a proven track record of delivering high quality MEMS devices.

As a fab-less MEMS company, Preciseley's business model is to retain in-house design expertise and intellectual property while working with partner companies across the globe who perform MEMS manufacturing and integration according to co-developed processes.

Potential Partners Requirements:

Provides Custom Optical MEMS Chips/Modules to:

- Carl Zeiss Meditec AG: Scanning MEMS mirror device for Optical Coherent Tomography (OCT);
- Carl Zeiss SMT GmbH: MEMS mirror array device for maskless lithography;
- Heidelberg Instruments: MEMS mirror array device for maskless lithography;
- ALLTEC GmbH: Steering MEMS mirror device for laser marking

Working with following foundry to develop new Optical MEMS Chips/Modules:

- X-FAB MEMS Foundry Itzehoe: Fabrication of the MEMS chip;
- Fraunhofer Institute for Photonic Microsystems (IPMS): Fabrication of the MEMS chip



### 3) Hookflash ([www.hookflash.com](http://www.hookflash.com)):

Headquartered in Calgary, Canada with a team of leading P2P audio, video and software developers in Canada, the US and Europe; Hookflash builds “Open Peer”, an advanced new generation of Peer-to-Peer (P2P) open source communications software.

Open Peer enables software developers, enterprise users, and other customers to directly integrate high quality video, voice and messaging communications into their own applications, software and workflow. Open Peer is available as a software development kit (SDK) for major mobile platforms – iOS, Android, and Blackberry, and as Javascript libraries for WebRTC.

This enables users to connect globally and communicate securely via the Internet at exceptionally low costs smartphones, tablets and computers across web and mobile platforms.

“Open Peer” technology from Hookflash enables businesses from large carriers and enterprise, such as Deutsche Telekom and SAP, to small developers, to easily integrate high quality, secure voice, video and messaging into their own software, networks and workflow.

Somewhat like being able to integrate “open” Microsoft Skype or Apple Facetime, Hookflash Open Peer provides improved communications functionality while significantly reducing costs.

The company is typically working with three types of customers:

- Large Service Providers such as Telephone Carriers, Cable Television providers
- Software developers - For example, we're working with a software group that provides high quality diagnostic imaging on mobile devices for healthcare professionals. This company will use OpenPeer to integrate live voice, video chat and messaging into their imaging application so healthcare professionals can communicate and collaborate securely from a private directory integrated in the software.
- Systems Integrators and Solutions Providers - use OpenPeer to easily add voice, video chat or messaging into any application on any mobile or web enabled device.
- Hookflash is currently working with one of the largest US cable providers, integrating voice, video and messaging services with social directories for use through set top boxes and mobile devices.

They are also working with a California based systems integrator that is using OpenPeer to add voice and messaging services over WiFi directly into retail point of sale software on the iPods for one of the 50 largest retailers in the US.

Hookflash has hundreds of small developers using OpenPeer to build voice, video and messaging services into their own applications and software.

Potential Partners Requirements:

We are seeking partners interested in using our OpenPeer software to integrate voice, video chat and messaging into their own applications and software.

4) Expert Decisions Inc. (www.expertdecisions.com):

Expert Decisions Inc. is a University spin-off company is offering Software as a Service (SaaS) as well as customized solutions for optimized product management. Product management is key discipline aiming at the a comprehensive approach for product-related information and knowledge management within an enterprise, including planning and controlling of processes that are required for managing data, documents and enterprise resources throughout the entire product life-cycle.

EDI's business strategy is focused on gaining competitive advantage through innovation. EDI's comprehensive decision support and scenario playing environment called ReleasePlanner™ has a unique selling proposition based on the following characteristics:

- Offering optimized and diversified planning alternatives (and not just one)
- Support of balancing development of new features versus stabilizing the existing system and fixing bugs
- Risk analysis capabilities
- What-if scenario playing
- Customization of optimized solutions utilizing knowledge of the human experts

Broad stakeholder involvement in prioritization against multiple and flexible planning criteria:

- Ability to accommodate all kinds of logical feature dependencies
- Integration of operational and strategic planning
- Compatibility with JIRA repositories for import and export of project information.

Based on cutting-edge research and a US-patented technology on release planning, the company is providing premium services for:

- S1: Customer Needs Analysis (what is needed?)
- S2: Collective Prioritization (how important it is?)
- S3: Optimized Product Planning (what should be implemented?)
- S4: Resource Optimized Product Development (how and by whom should it be implemented?)
- S5: Product Evaluation (how good was it?)

Potential Partners Requirements:

Products are growing in size, complexity, scope and quality demands. EDI's focus is on decision-making processes in companies offering software and software-based products. Often, decisions are made ad hoc and reactively. This style of decision-making is risky and needs to be changed into real-time and pro-actively driven.

We are looking for companies understanding the value of improved product management processes and decisions, and interested to collaborate with a technology driven SME to develop a customized solution on this problem.

**C) Optics:**

**1) Stream Technologies Inc. ([www.streamtechinc.com](http://www.streamtechinc.com)):**

Stream Technologies Inc. is a Canadian company developing a patented optical technology that permits real-time spectral imaging. The product is a single optical element that takes in full colour images and spatially segregates full images into colour channels, with no scanning or Fourier Transform. The technology can operate from UV to long infrared.

Stream is looking to partner with optics companies, especially those involved in spectral imaging, optical system development, or image processing software.

**2) Nanalysis ([www.nanalysis.com](http://www.nanalysis.com)):**

Nanalysis was established in 2009. The company develops and manufactures portable Nuclear Magnetic Resonance (NMR) spectrometers for the laboratory instrumentation market. In the fall of 2012, the first product was launched: NMReady™, the first fully featured bench-top NMR spectrometer in a single compact enclosure requiring no liquid helium or any other cryogenes. The NMReady is used by chemistry professionals in all types of industries (oil & gas, chemical, pharma, biotech, food processing) as well as government and university labs. The NMReady enables chemical trainees to gain first-hand knowledge of NMR as the premier spectroscopic method by using it in a variety of training environments. The marketing launch of the product was in Fall of 2012 and began shipping in January 2013. Since then, customers in Canada, The United States, U.K., Singapore, Japan, Korea, Turkey, and Argentina have purchased NMReady, and we are aggressively expanding our distribution network globally.

Potential Partners Requirements:

Our current product is in a bench-top form factor and it is used by customers in the chemistry lab (see latest brochure <http://nanalysis.com/docs/nmready-tech-brochure-1307.pdf>). We need a partner to build an external flow-through apparatus for production environments (chemicals, pharmaceuticals, foods, oil & gas). This partner

must also have the domain expertise to help develop the associated software application. Examples of these kinds of partners would be companies that already have flow automation instruments that want to add NMR analytical capabilities etc. We are also looking for a distributor for our current bench-top NMR spectrometer in Germany. We would prefer to deal with a SME that operates locally (Germany, Austria, and surrounding countries), rather than a global instrumentation company, because we already have representatives in many other parts of the world.

#### **D) Air&Space:**

##### **1) Western Avionics ([www.avmax.ca](http://www.avmax.ca)):**

Western Avionics is a Transport Canada, FAA and EASA approved avionics repair, installation, modification and manufacturing facility.

Western is a division of Avmax Aviation Services Inc. which owns operates, leases and maintains a fleet of over 100 Dash-8 and CRJ aircraft worldwide. Avmax is privately owned with its head office, a heavy maintenance MRO, Engineering and Spares distribution centre located in Calgary, Alberta. Worldwide operations include a parts distribution centre in Nairobi, Kenya, an MRO in Great Falls, Montana and an MRO in Jacksonville Florida. Other holdings include Regional 1 a charter airline operating with the UN in Afghanistan and two commercial contracts in East Africa.