

The Corporate Knights Next 10 Emerging Cleantech Leaders of Tomorrow represents the up and coming Canadian companies that through a combination of internal strengths and external drivers have the best potential for being the Cleantech leaders of the future. The Next 10 were selected by an advisory panel of Canada's foremost authorities on Cleantech (see p 21).



6N SILICON INC.

6N's proprietary low-cost silicon purification process provides a revolutionary approach to the production of solar grade silicon for the photovoltaic industry. The global market for solar grade silicon in 2006 was approximately \$2.3 billion and is projected to grow to \$10.4 billion by 2010, according to Ventures West, a private venture capital group.

By converting cheap, readily available metallurgical grade silicon directly into solar-grade silicon, 6N is able to avoid the chemically-intensive and expensive process employed by the semiconductor industry. By significantly reducing the cost and energy consumed to purify the principal material used in the manufacturing of crystalline photovoltaic cells, the project aims to help speed up the adoption and growth of photovoltaic power.

"Our process will decrease the cost of the silicon, which will help to decrease the cost of solar cells and the electricity from solar cells," says Nichol. "We will significantly decrease the amount of energy required to purify silicon, which is the largest energy usage in making a solar cell."

—Scott Nichol, President and CTO

ENERWORKS INC.

Enerworks is North America's leading developer and manufacturer of solar thermal technology, using a technology developed at the Queens University solar lab. Producing the only CSA-approved solar thermal systems, EnerWorks' client list includes Toronto's Hospital for Sick Children, where it will be preheating the hospital's hot water supply and the Drake Landing Solar Project in Alberta, North America's first solar-heated community.

ENSYN TECHNOLOGIES INC.

Ensyn Technologies is demonstrating an industrial integrated biomass refinery concept which uses a Rapid Thermal Processing (RTP) process to produce biofuel and other valuable chemical products from what would otherwise be a waste source such as sawmill waste.

"It is the only commercially proven pyrolysis process that exists that's been offered on a sustained basis,"

says Randal Goodfellow, spokesman for Ensyn. Pyrolysis is the conversion of biomass into a liquid, from which chemicals and energy can be extracted. This energy can be converted into liquid fuel for heating, and eventually for transportation.

GROUP IV SEMICONDUCTOR INC.

Group IV Semiconductor is demonstrating a new breed of low cost, high efficiency silicon based solid-state lighting products. The project builds on a revolutionary silicon thin-film process that for the first time will enable solid-state lighting to reach the mass market. The benefits of solid-state lighting derive from a much higher efficiency than conventional light bulbs, reducing energy consumption by as much as

80 percent. Unlike compact fluorescent light bulbs, solid-state lighting is able to reproduce the full colour spectrum required by mainstream applications.

Group IV is challenging conventional light sources, which are highly inefficient, and vying for a chunk of the \$12 billion spent annually on lamps for illumination.

Solid-state lighting could save some 860 TWh of electricity per year, which translates to 200 million tonnes less of annual carbon emissions worldwide.

"The race is on to create energy-efficient lighting alternatives and we intend to be front runners."

—Stephen Naor, CEO

IOGEN CORP.

Iogen produces cellulose ethanol, a fully renewable, advanced biofuel that can be used in today's cars. All major North American auto manufacturers currently warrantee the use of gasoline blended with up to ten per cent ethanol.

Iogen's technology converts biomass into cellulose ethanol using a combination of thermal, chemical and biochemical techniques. The yield of cellulose ethanol is more than 340 litres per tonne of fibre. Iogen's biggest investors include Royal Dutch Shell, Petro-Canada, and Goldman Sachs.

According to the Government of Canada, if 35 per cent of gasoline in Canada contained ten percent ethanol, GHG emissions would be reduced by the equivalent of removing more than 400,000 vehicles from the road (or 1.8 Mt of GHGs per year).



Enerworks Residential EnergyPack Panels



MAGENN POWER INC.

Magenn Power has developed the Magenn Air Rotor System (MARS), a new type of wind power generator, a lighter-than-air tethered wind turbine that rotates about a horizontal axis in response to wind, generating electrical energy. It uses helium to elevate higher than traditional wind turbines, thereby capturing

more energy. The company has attracted the former Chairman and CEO of Hydrogenics as its new CEO. Since it can rise above other turbines, the need for coastline or off-shore wind farm locations is eliminated; MARS can be deployed anywhere worldwide. As well, MARS is bird and bat friendly, allaying some of the concerns that environmentalists have with traditional systems.

MARS technology is also cost-effective, since its efficiency level is 40 to 50 per cent and its mobility allows for wind farms to be placed closer to where demand is greatest, lowering the costs of transmission. Magenn Power plans to ship its first official product, a 10 kW version of MARS, in 2008.

MENOVA ENERGY INC.

Menova has developed the Power-Spar® system, a high efficiency solar concentrator that uses a patented system to create heat, electrical power, and lighting for everyday and emergency use. It has been specifically engineered for performance in extreme climates. The company's new generation of triple-junction solar cells can accept intense sunlight with approximately 40 per cent efficiency compared to traditional flat-panel cells' 10 to 20 per cent. Menova's technology also has applications in the creation of renewable fuels. Algae, which can be turned into ethanol or biodiesel, can be grown in a

photo bioreactor. Menova entered into a joint venture in December 2006 with Trident Exploration, a natural gas exploration company whose processes create carbon dioxide. This carbon dioxide is being used by Menova as an input in algae production.

"It is a solar concentrator that does both photovoltaic electricity and heat on the same unit – and nobody else does that."

—Randal Goodfellow, Advisory board member

PLASCO ENERGY GROUP INC.

Plasco Energy is demonstrating a Plasma Gasification process that will economically convert 75 tonnes a day of municipal solid waste into synthetic gas, inert solid material and heat. The heat and gas will be utilized in a power plant to produce electricity for sale into the electricity grid. By avoiding current disposal methods such as landfill or incineration, Plasco's new approach represents a breakthrough in both economic and environmental attractiveness.

"There continues to be a large portion of waste that is not environmentally or economically practical to recycle. With our technology, only one-tenth of one percent of waste will remain to be disposed of."

—Rod Bryden, President and CEO of Plasco



Regen wireless controller

REGEN ENERGY INC.

REGEN Energy has developed a wireless device that is attached to major appliances that cycle on and off in buildings and factories. The devices communicate with each other—using what some call "swarm logic"—to make sure the appliances, such as air conditioners and fans, don't operate at the same time. This reduces peak consumption and represents a more efficient use of energy.

"It's a completely new way of thinking how to control equipment."

—Mark Kerbel, President and CEO.

EDITOR'S PICK



Triton Logging specializes in finding buried treasure—and in this case, the treasure is underwater forests.

TRITON LOGGING INC.

Triton Logging is the world's leader in harvesting flooded forests. This company has a patented technology that allows for safe, environmentally sound commercial logging of hydroelectric sites. Today, 300 million submerged trees globally are a sunken treasure, and Triton has developed the "Sawfish," the world's only deep-water logging machine, to retrieve them. The Sawfish uses biodegradable fuel and can handle larger trees than any land-based harvester due to water buoyancy.

They are the technology leader in an estimated \$50 billion international industry.

"We're reducing the consumption of living forests, we're reusing something that was lost in a hydro project, and we're recovering resources."

—Chris Godsall, President and CEO