

GREEN  
INNOVATIONSMAKING CANADA  
A GREEN WORLD  
LEADER

**Through a green lens:** creating Canada's next steps  
in the bio-economic landscape

**A greener  
business**  
Increasing your  
triple bottom line



JOHN GORMAN

**Canada's  
resources**  
A bio-based  
industry on the rise



GREEN IN YOUR HANDS

**Driving Change**  
Making a move to  
mobilize change

#### ↓ THE 12 PRINCIPLES OF GREEN CHEMISTRY

- 1 Prevention**  
It is better to prevent waste than to treat or clean up waste after it has been created.
- 2 Atom Economy**  
Synthetic methods should be designed to maximize the incorporation of all materials used in the process into the final product.
- 3 Less Hazardous Chemical Syntheses**  
Wherever practicable, synthetic methods should be designed to use and generate substances that possess little or no toxicity to human health and the environment.
- 4 Designing Safer Chemicals**  
Chemical products should be designed to effect their desired function while minimizing their toxicity.
- 5 Safer Solvents and Auxiliaries**  
The use of auxiliary substances (eg. solvents, separation agents, etc.) should be made unnecessary whenever possible and innocuous when used.
- 6 Design for Energy Efficiency**  
Energy requirements of chemical processes should be recognized for their environmental and economical impacts and should be minimized. If possible, synthetic methods should be conducted at ambient temperature and pressure.
- 7 Use of Renewable Feedstocks**  
A raw material or feedstock should be renewable rather than depleting whenever technically and economically practicable.
- 8 Reduce Derivatives**  
Unnecessary derivatization (use of blocking groups, protection/deprotection, temporary modification of physical/chemical processes) should be minimized or avoided if possible, because such steps require additional reagents and can generate waste.
- 9 Catalysis**  
Catalytic reagents (as selective as possible) are superior to stoichiometric reagents.
- 10 Design for Degradation**  
Chemical products should be designed so that at the end of their function they break down into innocuous degradation products and do not persist in the environment.
- 11 Real-time Analysis for Pollution Prevention**  
Analytical methodologies need to be further developed to allow for the real-time, in-process monitoring and control prior to the formation of hazardous substances.
- 12 Inherently Safer Chemistry for Accident Prevention**  
Substances and the form of a substance used in a chemical process should be chosen to minimize the potential for chemical accidents, including releases, explosions, and fires.

SOURCE: ANASTAS, P. T. AND WARNER, J. C. GREEN CHEMISTRY: THEORY AND PRACTICE. OXFORD UNIVERSITY PRESS: NEW YORK, 1998, P. 30



# CHALLENGES



By exploring the scope of sustainable business practices and building a bio-based economy, **Canada is stepping up our green game.**

## Industrial biotechnology and Canada's role for the future

The world is starting to seriously embrace industrial biotechnology and the movement to green and more sustainable products, with the growing recognition of the positive impact on the reduction of CO2 emissions. In Europe, the policy is around "white biotechnology," which is industrial biotechnology. The European Union has a number of programs to encourage development of this sector. Europe has a long term focus on moving to more sustainable technologies, which will use the tools of white (industrial) biotechnology as a key to getting there.

### More than green fuel

The World Wildlife Fund produced a global study and report, "Industrial Biotechnology - more than green fuel in a dirty economy?" (<http://www.energyboom.com/category/tags/world-wildlife-fund>). This report identifies our fundamental dimensions of the continuation of industrial biotechnology: improved efficiency, the substitution of fossil fuels, the substitution of oil based materials, and the creation of a closed-loop system with the potential to eliminate waste.

### Collaboration is key

The United States recently released "The National Bioeconomy Blueprint," which outlines their five key objectives, one of which is fostering

partnerships, on which President Obama stated:

"We're all familiar with clusters like Silicon Valley. When you get a group of people together, and industries together, and institutions like universities together around particular industries, then the synergies that develop from all those different facets coming together can make the whole greater than the sum of its parts."

Europe, the United States, the World Wildlife Fund and several countries have embraced industrial biotechnology. Canada is one of those countries that have stepped up and are putting appropriate policies in place to capture the benefits and opportunities of the bio-based economy.

### Call to action

A report by BIOTECCanada, "The Canadian Blueprint — Beyond Moose and Mountain — How we can Build the World Leading Bio-based Economy," provided some good recommendations for Canada to consider (<http://www.biotech.ca/en/policy-matters/beyond-moose-and-mountains/bio-techstories.aspx>). This industry-led blueprint is a call to action for Canada. Canada needs to and is embracing biotechnology and the bio-based economy as catalysts for our next phase of innovation and prosperity. Having a more sustainable and green economy is no longer mutually exclusive. The tools of industrial biotechnology are key to having both capacities in Canada as we possess one of the world's



**Dr. Murray McLaughlin**  
President and CEO of Sustainable Chemistry Alliance and Executive Director of Bioindustrial Innovation Centre

largest and most impressive biomass supplies.

### Canada's role

Canada is just beginning to move in that direction of increased sustainability, but still needs to work on regulations and policies that will help to expediate movement to a bio-based economy, and position Canada in a world leadership position. We are seeing several regional organizations taking up the challenge of establishing Canada in the leadership role.

Organizations like CRIBEQ (in Quebec); BioAtlantech (New Brunswick); BioAlliance (PEI); BioEnterprise and OAFI (Ontario); Ag-West Bio (Saskatchewan); CRIBE (Ontario Forestry); and others, are all pushing to make Canada a world leader in bio-

technology and sustainability. At the Sustainable Chemistry Alliance (SCA) located in Sarnia, Ontario, supported with federal funding from Bioindustrial Innovation Centre, a Centre of Excellence for Commercialization and Research (CECR), the focus is on the commercialization of bio-hybrid chemistry and sustainable technologies. To date SCA has made 11 investments of 5.2 million in the pilot to demonstration stages of technologies, creating over 1800 direct and indirect jobs and having over 130 million dollars of investment in Canada. SCA is one small piece of a much needed focus on the industrial biotech and sustainable technologies.

### Vital partnerships

In Sarnia, a true cluster is building in the area of green and sustainable technologies, based on the concept of "fostering partnerships" and seeing the synergies develop from having all the right individuals come together within industry, college, universities, and local governments, to support the cluster.

As stated in the BIOTECCanada report:

"The challenge is to engage all Canadians in building a bio-based economy that becomes the foundation for a safer, cleaner, healthier and more sustainable future." Let's meet the challenge.

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## Leaving behind a green footprint

**Attaining greener habits is an easier transition than one may think. Canadian businesses are taking bigger strides in tackling green innovations. It has now become a noteworthy characteristic that leaves a positive reputation.**

A green business can only take on the title entirely if it follows the right criteria - incorporating principles of sustainability into each of its business decisions, supplying environmentally friendly products and services that replaces the demand for non-green products, services, and making an enduring commitment to environmental principles in its business operations.

### Positive alternatives

Canadian companies need to take into consideration the benefits of our renewable resources. Canada's large landmass and unique geography make it a top location for renewable energy.

There are many different meth-

ods of renewable energy sources. For instance, biomass is the method of removing usable energy from biological material in solid, liquid or gaseous form, and wind power can be transformed into mechanical energy, or electricity.

Currently, the most popular source is solar energy, which utilizes energy from the sun.

### Business meets environmental happiness

The Ontario Environment Industry Association (ONEIA) is a business association that helps support the environmental industry in Ontario.

"While our industry is diverse, ONEIA provides a place where a variety of companies, entrepreneurs and other organizations, as a team, can be more efficient in creating a society that understands and values how the market can contribute to environmental problems." An association like ONEIA encourages businesses to think about the environment when making decisions.

Besides renewable sources, another

great alternative is incorporating green chemistry - the use of chemistry for pollution prevention - into the manufacturing process. It is a process that is applied to the design, manufacturing, and use of the chemical product. This substitute results in less waste, and safer products.

### Green companies

There's an annual list of 100 Canadian companies that are cited to be "Canada's Greenest Employers," crafted by the editors of Canada's Top 100 Employers Project.

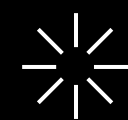
Companies are being recognized for various reasons, such as incorpo-

ating the creation of green teams at office locations to involve workshops on energy conservation as well as waste reduction initiatives.

Green accomplishments also include encouraging consumers to bring in old electronics for proper recycling, as well as making movements to integrate more renewable sources. Year after year, these top environmentally friendly companies model how society and businesses alike should make greener decisions.

**PAULA REID**

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### WE RECOMMEND



**Debbie Baxter**  
VP Workplace Services & Chief Sustainability Officer, LoyaltyOne

PAGE 07

"Stand-alone environmental building features are evolving into fully operational programs and sustainability is being integrated into core business strategies."

**Eco-friendly chemicals** p. 05  
Game-changing green solvents

**Intelligent sustainability** p. 06  
Strategic and holistic operational views



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### GREEN JOBS: THE PLACE TO GO

Canada is facing enormous environmental challenges. Our resource industries are imposing demands on our natural environment, we need greener ways of producing and using energy, and our cities can still become more sustainable. More than ever, our national environmental agenda demands committed individuals that are ready to lend a hand.

### Rise in green jobs

According to ECO Canada, jobs in the green economy are continuing to expand quickly. Private and public sector employers are seeking employees that understand the technical aspects of environmental challenges: everything from managing and reducing waste to restoring natural environments. Potential green employees must also have "softer" skills, such as being able to organize their work, communicate effectively on paper and in person, and work well with others.

### Green graduate

Graduates of university environmental science and studies programs have these skills and knowledge. These programs are now available in every province. Some of the best have been accredited by ECO Canada. In 2010, Trent University's Environmental and Resource Science B.Sc. Program became the first Canadian environmental program to be accredited.

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PROFESSOR & CHAIR  
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# INSIGHT



# Driving the way to a greener future

## A SIMPLE IDEA

Green innovation in transportation is not just a matter of technology; it is also a question of bringing a new outlook to our transportation habits and of introducing innovative organizational solutions. Enter carsharing – a service that provides its members with exclusive access to a network of cars – available without delay 24/7, that can be reserved for as short a period as a half-hour or as long as several days or weeks. This service is offered at a low cost, members pay per use and pick up the cars in the heart of their neighbourhoods.

## Young history

This is the first service of this kind still in operation in North America. It was launched in Quebec City in 1994, by Benoît Robert. This young urban planning student felt that the need for a car, to go grocery shopping or to enjoy the great outdoors, was not worth the hassle of actually owning

a car. Putting thought to action, Communauto was born, starting off with just three cars.

The fleet now consists of 1,200 vehicles used by more than 25,000 members in Montreal, Quebec city and two smaller Quebec cities: Gatineau and Sherbrooke. The idea was in tune with the times as most North American cities now have their own carsharing service.

Pioneer organisations such as Modo (Vancouver), Autosshare (Toronto), and Vrtucar (Ottawa) paved the way and many others followed, such as Zipcar (Boston, San Francisco, Chicago, New York). In Canada, almost 100,000 people have adopted this service provided by 20 different organisations, going beyond major metropolitan areas and reaching cities all over the country: Ottawa, Halifax, Kitchener, Waterloo, Victoria, Edmonton, Calgary, Winnipeg, and Regina.

## Positive impact

The idea is simple: in urban areas,



Marco Viviani  
Director,  
Communauto

sharing a fleet of vehicles is better than owning one. On the practical side, carsharers save time by not having to continually search for parking near their homes, by not having to shovel snow or maintain their car. From the economical point of view, carsharing brings savings that reach \$5,000 per year, which can be invested

in other activities or priorities. Once free from car ownership dependency, people use different sustainable transportation modes more effectively, from transit to taxis, to bike-sharing to car rentals.

Car sharing makes for a more efficient use of the car, therefore the benefits for the environment and for our cities are quite significant: a car-sharing vehicle replaces on average 10 privately owned vehicles and the reservation/pay per use car sharing system induces a more rational use of the car, which on average reduces by 35 percent the number of kilometers traveled yearly.

## An electric future

Sharing a car is also a great way to access the latest environmentally friendly technology. For the past year, members of Communauto, Autosshare and Vrtucar have been able to drive all-electric vehicles. Accessing this costly new technology through carsharing for a few tens of dollars a

year is not only a bargain but also an advantage that, unfortunately, not all Canadians can benefit from yet.

Great news: innovation is just beginning! New sharing or on-demand car services are available or will soon be available for Canadians: P2P Carsharing, allowing private car owners to share their car with their neighbours; or one-way on-demand cars, launched in Vancouver in 2011 and planned for Montreal.

## Drive on

In order to make carsharing accessible to more and more Canadians and therefore increase its positive impact on the environment, it is imperative that cities and citizens take action and support this growing concept as it promises to bring change and make our neighbourhoods greener.

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## INSPIRATION

# Bio-based chemistry and Canada's future

## HYBRID CHEMISTRY

Canada has always been an exporting nation, particularly of natural and agricultural products. Today as we see increasing global population, depletion of many resources, increasing environmental pressures, and climate change, Canada needs to consider how to manage our abundant biological resources and capture the biobased chemistry opportunities.

### An industry on the rise

In the chemical sector, Canada has seen our traditional industry shrinking over the past decade or two and a loss of jobs. Biobased chemicals or hybrid chemistry are in general the same as the petroleum-based counterparts, except for being manufactured from renewable resources. Renewable biomass combined with advances in biotechnology make it possible to produce many chemicals without petroleum. These bio-based products can supplement a wide variety of petroleum-based products. This effort in Canada will lead to a hybrid chemistry sector and see the creation of an industry around biomass. Biomass will be an industry within

the value chain that goes from the farmer to the processing of the cellulosic biomass to sugars.

The industrial — green and sustainable — biotechnology industry, often referred to as white biotechnology, is involved with the production and processing of chemicals, materials, pharmaceuticals, and bioenergy using bacteria, enzymes, yeast or other biological pathways with low energy requirements. It uses microorganisms and enzymatic catalysis to produce products instead of the high heat and pressure conditions used with petrochemicals. Feedstocks for industrial biotechnologies are from forestry and agricultural starches and lignocellulosic residues, such as wood, straw, and corn stoves.

### The payoff

Why green and sustainable biotechnology in Canada?

- It provides new pathways to create chemicals and substitutes for existing consumer products.
- It provides more efficient means of creating widely used chemicals and biomaterials.
- It uses renewable biomass as a feed-



## PROFILE

**Dr. Murray McLaughlin**  
President and CEO of Sustainable Chemistry Alliance and Executive Director of Bioindustrial Innovation Centre

stock for chemical manufacturing.

- It creates new markets for agricultural waste products.
- It creates opportunities for new biomass and oilseed crops such as miscanthus and comalina.
- It reduces dependence on petroleum products.
- It creates a hybrid industry that combines the bio-based and petroleum chemistry's for new products.

### Beyond the funding gap

The bio-based products/chemistry industry has appeal to policy makers — it has environmental advantages and offers alternatives to petroleum oils. The more immediate is on increased jobs and diversified income in the rural agricultural areas of Canada. As the industry works to develop this sector they will need to have participation and cooperation of local, provincial and federal governments, academia, investment sector and industries. We need to find the means to get companies beyond the funding gaps and into commercial scale production. The first company to break through to commercial scale is BioAmber with their bio succinic acid

plant announcement for Sarnia.

Within Canada today we are seeing a few clusters develop as the models for the bio-based industries — Sarnia in Ontario and Drayton Valley in Alberta are becoming established. There are several other locations that are at the front edge of the wave. The Bioindustrial Innovation Centre and Sustainable Chemistry Alliance, (funded by the federal CECR program) are establishing the model for cluster success, with Sarnia as the first establishing cluster for white biotechnology.

### Canadian opportunities

The bio-based chemistry and bioproducts industries are true Canadian opportunities for the 21st Century — opportunities that will make Canada a global leader from research and development to commercialization and from the farm to bio-based chemical and bioproduct facilities. We are beginning to see this leadership effort unfold as the first clusters are being established. The momentum needs to continue.

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**Sustainable Chemistry Alliance**  
Fostering Commercialization of Green & Sustainable Chemistry

**SCA Investments – Building the Future**

**Murray McLaughlin**  
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**SARNIA ONTARIO**  
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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 and Research with funding from the Government of Canada.

**Miscanthus**

Miscanthus is the highest biomass yielding purpose grown crop for energy and fibre uses. It is widely grown in Europe, especially in the United Kingdom. Miscanthus is a perennial grass which is productive for 15-20 years. Two varieties of miscanthus, Giganteus and Amensil, are planted at this demonstration plot. Pyramid farms from Leamington donated the miscanthus plugs to the Research Park to establish this demonstration plot.

**BIOINDUSTRIAL INNOVATION CENTRE**

**Cultivating Innovation for a Sustainable Tomorrow**

The Bioindustrial Innovation Centre is Canada's preeminent accelerator for the commercialization of large scale industrial biotechnology and related sustainable chemistry. 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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# INSIGHT



# Green chemistry: Road to commercialization

## A HANDS-ON APPROACH

In last year's Mediaplanet report on "Green Chemistry," we discussed the paradox of looking to chemical innovation for environmental remediation. Ironically, the answer to our environmental challenges is to embrace chemistry—that is, Green Chemistry, which focuses on the development of chemical products and processes that reduce waste, provide safe products, and minimize the use of energy and resources. Consequently, if we accept this notion that chemical innovation is key to sustainability, then we need to be more specific in what we mean by "innovation."

### From lab to market

Academic research is an important source of green chemistry innovation.

However, we are limiting the potential for these discoveries when they remain "stuck" in the lab or are relegated to academic literature. Innovation, for it to improve the environment and our quality of life, must be mobilized into the market place. But how do we get things out of the lab and into the market? Well, of course we need to commercialize the technology. Commercialization, however, is something that is easier said than done.

### Challenges

The myriad of challenges that stand between a breakthrough innovation and implementation in the market place is often, and dreadfully, referred to as the "valley of death." At GreenCentre, we prefer to refer to these challenges as the "valley of ifs." After

all, continued investment into the commercialization of any technology requires satisfaction of a number of "if" questions, often, from a variety of stakeholders. So, while the task is challenging, it is far from dreary. And while talking about commercialization is a critical first step, this endeavor must move beyond a mental exercise. Commercialization is a physical exercise that requires us to move from theory to practice, taking a "hands on" approach.

### Hands-on solutions

At GreenCentre Canada, a national Centre of Excellence for Commercialization and Research and member of the Ontario Network of Excellence, we take this "hands on" approach to green chemistry commercialization. Our highly experienced technical

and commercial teams address and overcome the "ifs" of early stage green chemistry innovations by determining their applications, customers and production costs, while providing scale-up manufacturing and intellectual property management. These activities prepare technologies for the marketplace, positioning them to make positive environmental and economic impacts. Already we're seeing some of our technologies emerge into the market for final stages of validation and implementation.

In 2011, GreenCentre established its first spin-off company, Switchable Solutions Inc., based on a "game changing" green solvent technology that forms the basis of a green oil sands process. With the potential to extract 230 million barrels of oil from oil sands deposits with minimal

water consumption and without the creation of tailing ponds, this innovation is poised to make a huge environmental and economic impact in Canada and throughout the world.

### More to come

This is just one example of the potential that green chemistry innovation has on creating a sustainable environment and vibrant economy. GreenCentre is just beginning to see the fruits of our "hands on" approach to commercialization and the best is yet to come. Stay tuned!

DR. RUI RESENDES  
GREENCENTRE CANADA  
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## Green Chemistry: Enhancing & Preserving Our Quality of Life

Chemistry is at the heart of everything we rely on and society's ever-increasing demand for the chemical products that provide us with energy, transportation, agriculture, medicine and consumer products is threatening our environment and the sustainability of our quality of life.

### The solution: Green Chemistry

At GreenCentre Canada, we transform green chemistry breakthroughs into green products and services that enhance and preserve our quality of life and our environment for future generations.

Changing chemistry can change the world.

To learn more, please visit us at  
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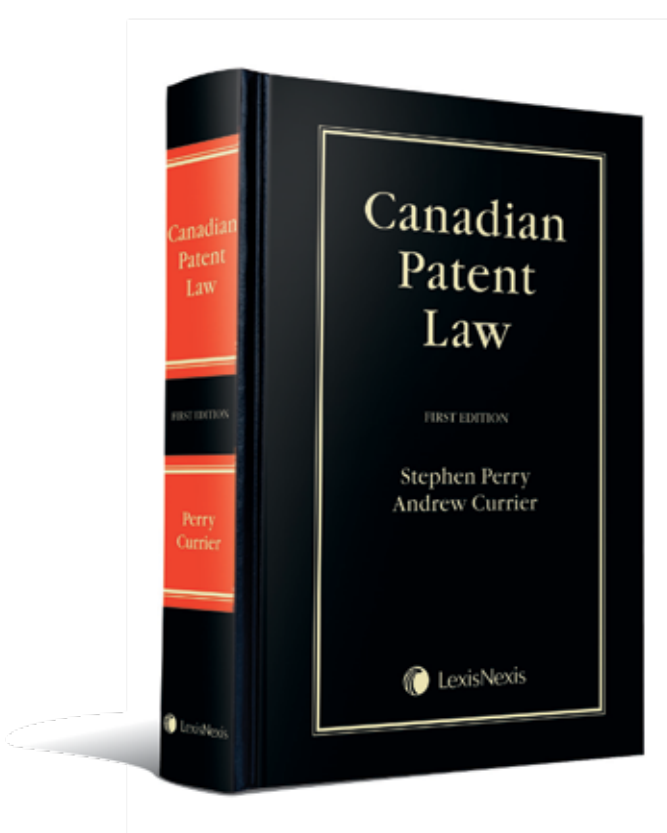
## NEWS



# Sustainability is just good business

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## SUSTAINABILITY SMARTS

The world is changing. Resources are becoming increasingly scarce; safe drinking water is in short supply; even our climate is changing, and, with the advent of social media, businesses are being watched unlike at any time in the past.

Companies that adapt their business practices with these new realities in mind will find opportunities to flourish, while companies that take a “wait and see” approach will find that change has passed them by as they struggle to survive.

### Future success

Future business success will hinge upon a more strategic and holistic operational view; a wider range of impacts must be considered.

A paradigm shift is needed in the way companies do business; leaders must look at both problems and opportunities with new eyes and find solutions that are consistent with our changing realities.

Corporate assumptions must change. New and different questions must be asked. Who or what will be affected by our business decision? Are we taking a risk by sourcing products from such an unstable region?

Or, perhaps, the question is based on the price of energy: Is our global supply chain at risk from rising oil prices or a carbon redistribution tax that supports non-polluting energy sources while taxing ones that contribute to climate change and pollution?

Companies and their employees



**Brad Zarnett**  
Founder,  
Toronto Sustainability Speakers Series

must change their decision-making processes based on a new vision that considers environmental and social harm.

### Culture shift

Companies that are leading the way are undergoing a shift in corporate culture; this is no easy task.

The biggest challenge for corporate sustainability is that most people are neither prepared nor supported in their organizations to think innovatively. Metrics that support old style thinking are still the norm in organizations.

Sadly, little will change until people are given an incentive that benefits them directly, or until the new culture of the company is so deeply embedded into all aspects of the organization, that not taking a holistic view would be a glaring cultural misstep.

### Fostering a student mentality

There's little doubt that sustainability is the best business strategy of our time. But it won't be a single technological solution that saves us. Rather, it's an issue of human capital being supported and nurtured to think innovatively about our problems. It's about people in organizations being rewarded for trying and sometimes failing, but always feeling supported for daring to think outside the box.

Organizations that develop a culture of problem solving and support unconventional thinking will be best suited to thrive in the sustainability era. The real corporate winners will be the ones who develop their human capital, because it will be those sustainability change agents who identify, imagine and implement the technological and business solutions.

### A united vision

We are blessed in Canada with incredible natural resources and an educated population; we have all the building blocks to be a global sustainability leader.

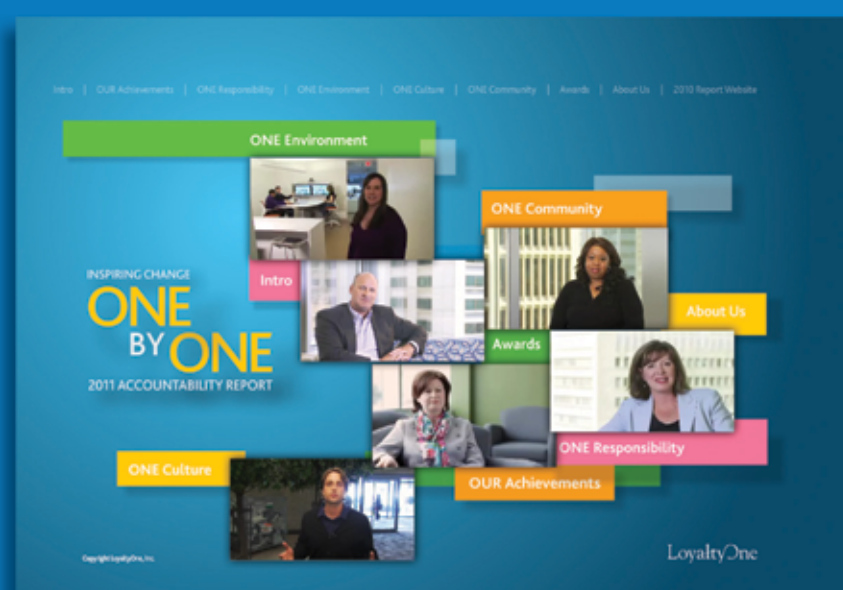
With a little bit of vision and a shift towards more holistic thinking, we have the ability to create high paying jobs that export sustainable solutions around the world.

At the end of the day, sustainability is nothing more than good business in a changing environment.

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## INSPIRING CHANGE

# ONE BY ONE



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# PANEL OF EXPERTS

	Question #1 What is the future of green innovation in Canada?	Question #2 What is the value of integrating innovative sustainability strategies into business operations?	Question #3 What are the biggest misconceptions of the green industry?
 <div>Debbie Baxter VP Workplace Services and Chief Sustainability Officer, LoyaltyOne</div>	At LoyaltyOne, we believe that green innovation is transforming the way Canadian companies engage with stakeholders, locally and globally. As an example, stand-alone environmental building features are evolving into fully operational programs and sustainability is being integrated into core business strategies. Acquired learning from green innovations is inspiring a shift in individual consumer behaviours and organizational belief systems. As companies learn how to leverage their influence, focus will expand to other areas, like <b>community building</b> and health and wellness.	For us, it's all about driving LoyaltyOne's recruiting brand, <b>employee engagement and retention</b> . We have been on the Best Employers in Canada list for the past three years and recognized as one of Canada's Greenest employers, among other awards. In a recent survey, 94 percent of associates indicated that they took pride in our corporate environmental and community investment work. This kind of passion helps us retain and nurture talent.	There's a general sense in the marketplace that it's all band-aid solutions, it's not authentic and it's a branding exercise. At LoyaltyOne, we recognize that every business has a critical role, and a responsibility to create a more sustainable planet. Challenges such as climate change and evolving social policies require all of us – business and individuals – to work together to find solutions and take authentic action that <b>create positive change</b> .
 <div>Susan Sheehan President, Leapfrog Sustainability Inc.</div>	Canadian companies planning to be in business in five years must make green innovation core to their DNA. Why? Green innovation is not just about new products or technologies that deliver environmental benefits. The real game changer is for companies to consider how 'greening' is the key that unlocks innovation across an organization. What happens when a business looks at all of its operations – from procurement to production to recruiting – through a 'green' lens? That's when breakthrough green innovation and <b>competitive advantage occurs</b> .	Sustainability strategies are unique to each business and offer a direct path to <b>competitive advantage</b> . Short payback projects that reduce energy, materials and waste costs go directly to the bottom line, some of which can be used to fund longer-term initiatives that put lasting distance between competing firms. This is what leading global brands across all industries are doing. Their CEO's say the top benefits of sustainability strategies are differentiating their brand, retaining customers and attracting and engaging talented and dedicated employees.	Businesses and consumers continue to think that green is, by its very nature, more expensive than conventional options. But green is actually all about <b>using resources more efficiently</b> , or not at all. This means short and long term costs are actually minimized. Green business cases typically consider total cost of ownership – the cost of buying, shipping, maintaining and disposing – and the lowest cost option usually turns out to be the most attractive from a green perspective too.
 <div>Chad Park Executive Director, The Natural Step Canada</div>	With increasing demand on natural systems and resources, combined with an eroding capacity of natural systems to provide these resources, the <b>opportunities for green innovation</b> can only increase. The challenge for Canadian society will be how to create the conditions for more organizations to realize and grasp the opportunities. This will require creative approaches to collaboration; organizations that don't typically work together to do so need to find new ways to overcome barriers or identify opportunity.	When done properly, sustainability is an enabler of an organization's <b>core business goals</b> – e.g. profit, innovation, value creation, etc. It helps generate employee and customer loyalty, identify new risks and opportunities, and inspire creativity.	The biggest misconception is probably that there is a green industry at all – as a separate industry. The "greening" of business is going to touch every industry. There is ample evidence to suggest that sustainability is becoming <b>the key driver</b> of innovation in business overall. Our businesses need to and are playing a leadership role in coming up with whole new business models, technologies, and relationships that redefine how we meet human needs within the constraints of the carrying capacity of natural systems.



# What “Going Green” means to Canadian businesses

- **Question:** Why do green innovations present the most exciting business opportunity for Canada's future?
- **Answer:** Integrating sustainability into daily operations will increase the triple bottom line.

There's a growing global demand for Canadians to take on a leadership role that redefines how we view greener technologies.

The foundation of integrating innovative sustainability strategies into business operations starts with shifting our thinking. "Canadians should be excited right now because Canada, in many ways, is the global leader in solar development. Ontario is recognized around the world as being one of the best places to participate within the market to build solar strategies, so we're gaining international recognition as a place to do business," says John Gorman, President of CanSIA.

As a result, Ontario in particular, has created thousands of jobs and hundreds of companies that are

producing panels and inverters. The market has also appealed to finance companies and developers that help pay for, and advance solar projects.

**Information at your fingertips**

"The 'greening' of business is going to touch every industry," states Chad Park, Executive Director of The Natural Step Canada, an organization dedicated to helping businesses articulate their vision and develop strategies towards a sustainable future.

When executed correctly, sustainability enables an organization's core business goals such as: reducing costs and risks, opening new markets and

**FACTS**

- **Businesses Benefits:** Effective risk management, Improved employee satisfaction, morale or retention, cost savings and improved company or brand image
- **A Cut Above:** Sustainability-focused companies outperform their peers and achieve above average performance in the financial markets during the financial crisis



venue streams, increasing profit, innovation, and productivity, and engaging employees.

**FACTS**

- **Solar Power:** Canada is a world leader in solar-power research, development and commercialization
- **Happy Workers:** Companies that have a strong sustainability foundation have a higher retention rate and happier employees
- **Provincial Powerhouse:** Ontario is gaining international recognition as a place to do business

“Canada... is gaining international recognition as a place to do business.”

John Gorman  
President,  
Canadian Solar Industries Association

"The challenge for Canadian society will be how to create the conditions for more organizations to realize and grasp the opportunities. This will require creative approaches to collaboration," Park says.

Organizations such as Toronto Sustainability Speaker Series do a superb job at inspiring people to act so that their decisions effect change by showcasing companies that have found economic opportunity, fusing sustainability into their corporate strategy.

**Looking ahead**

The vision for the future is looking bright as all industries gain more opportunities to produce and contribute environmental and social impacts.

"Brand Canada is something very special. We need to protect and strengthen our collective brand and become a model for what it means to be a sustainability leader," says Brad Zarnett, founder of Toronto Sustainability Speaker Series. Organizations are encouraged to have a shift in culture and begin to see problems in a new way.

When a company allows individuals to think with an innovative mentality, the overall vision and way of life evolves to incorporate sustainability. Ultimately, it isn't just about the environment; it's also about social connections.



# Ontario's Biomass Resources: A Critical Part of Our Clean Energy Future



**By DON MACKINNON**  
President  
Power Workers' Union

A comparison of wind, solar and biomass generation, demonstrates that utilizing Ontario's vast agricultural and forestry biomass resources offers more environmental and economic benefits.

Wind and solar generation only produce electricity when the wind blows and the sun shines. That means, for more than seventy percent of the time, back-up power is needed to keep the lights on. It appears in Ontario that role will be filled by price volatile, carbon-emitting natural gas power plants that will become increasingly reliant on environmentally questionable U.S. shale gas. This will compromise the province's ability to meet its greenhouse gas (GHG) emission targets.

Biomass is not only renewable, sustainable and carbon-neutral — it has a crucial operational characteristic that makes it much more versatile than either wind or solar. It can produce electricity on demand. By utilizing biomass in our existing coal generating stations we can have electricity when we need it while displacing carbon-emitting natural gas generation instead of increasing it. Since it is grown here, it enhances Ontario's energy security.

Large multinational wind and solar developers receive generous subsidies. Billions more have been spent on new gas-fired generation to provide back-up. Ontario's energy security is compromised by the province's increasing reliance on natural gas imports, which exposes Ontarians to unnecessary price risks for both electricity and home heating. Meanwhile, the consumer costs for new transmission lines and the smart grid technologies required to manage erratic, low-efficiency generation from a multitude of geographic locations remain hidden.

Power contracts commit to the purchase of expensive wind and solar generation whenever they produce, whether we need the electricity or not. This has resulted in: diverting water around hydro-electric generators; surplus base-

load generation that Ontario sometimes pays neighbours to take; and the unnecessary maneuvering of our workhorse GHG emission-free nuclear plants.

Even Ontario's Green Energy Act requirements for domestic content in order to qualify for feed-in-tariffs are being challenged as discriminatory by the United States, Europe and Japan.

Ontario Power Generation (OPG), academics and private investors recognize that our province has the biomass resources, the technology and the infrastructure base required to be a global leader. OPG has undertaken extensive research and successful testing at our existing coal station sites and is now seeking approval to convert the Atikokan Generating Station from coal to biomass.

Although Ontario's long-term energy plan acknowledges that the Nanticoke and Lambton stations could be converted to use a combination of biomass and natural gas for peak needs, no contracts have been struck. Four generating units at Nanticoke and two at Lambton have already been shut down as part of Ontario's plan to stop using coal for electricity generation. Four more generators at Nanticoke, two more at Lambton, one at Atikokan and two at Thunder Bay are scheduled to be closed by the end of 2014.

It's time for Ontario to recycle all of these existing provincially owned stations for biomass and natural gas electricity generation. The benefits are clear: renewable, low-carbon electricity available for peak demand; lower capital costs compared to new natural gas plants; recycling existing genera-

tion and transmission infrastructure; enhanced energy security; thousands more jobs in Ontario's forestry, agricultural and transportation industries; and continued economic benefits for the supportive host communities.

The European Union and member countries like Denmark, Sweden and Germany are aggressively making biomass a large part of their energy mix as part of their carbon reduction strategies. That's why European companies are now seeking long-term contracts for Ontario's biomass resources.

Ontario will lose the environmental and economic benefits of this sustainable, carbon-neutral energy resource without immediate decisive action, a comprehensive biomass strategy and a clear investment plan.



## BIOMASS – A RENEWABLE ONTARIO ENERGY ADVANTAGE THAT WORKS

Repurposing the Nanticoke and Lambton coal generating stations to use renewable, carbon-neutral biomass like wood wastes, straw and purpose-grown crops from Ontario's farms and forests along with natural gas means:

- Renewable, carbon-neutral electricity when it's needed (unlike intermittent wind and solar generation)
- Reduced need for new natural gas generating stations
- Thousands of new jobs and hundreds of millions in economic growth
- Better energy security
- Lower greenhouse gas emissions
- Existing generation and transmission assets that continue to produce revenues for Ontarians

Now is the time to invest in Ontario's biomass advantage.

For more information please go to  
[www.abetterenergyplan.ca](http://www.abetterenergyplan.ca) or [www.ontariogrownpower.ca](http://www.ontariogrownpower.ca)

**FROM THE PEOPLE WHO HELP  
KEEP THE LIGHTS ON**

