This report is the second in a series addressing the top sustainability issues in Canadian business.


**Focus forward**
Enhancing supply chain value with green logistics and transportation
Supporting a greener, cleaner economy

With international trade now representing about 62% of Canada’s GDP, the logistics sector is a complex and vital contributor to Canadian prosperity.

Through increasingly global supply chains, the logistics industry inevitably touches every facet of our lives, both at home and at work. Today, these supply chains are in the spotlight. They are one of the first places informed consumers look to see what sustainable practices are associated with a given product or service. Consumers now better understand and take into account the environmental impact of the transportation of the goods they buy. That the sector is currently a significant consumer of fossil fuels is self-evident; however, this makes the industry’s emerging vision of a future with minimal environmental impacts even more important to achieve.

RBC® is pleased to have partnered with Supply Chain & Logistics Association Canada (SCL) to develop this Report on Business & the Environment aimed at CEOs and senior decision-makers in the logistics sector across Canada. Inside this report — the second in our series — you will find many inspiring stories and a compelling business case for making the transition to a cleaner, greener approach to supply chain management. These examples underscore how smart business goes hand in hand with environmental sustainability, and how environmental sustainability may hold a key to the future competitiveness of your business.

We welcome the opportunity to be your banking partner as you lead this change and help to protect Canada’s ecological and economic prosperity for generations to come. Whether you are seeking financing for an energy-efficiency retrofit, installing solar panels in your warehouse, considering purchasing hydrogen-powered forklifts or investing in electric trucks, RBC has advice and solutions to support you as you focus forward on these emerging opportunities.

Andrea Bolger
Head, Business Financial Services
Royal Bank of Canada
Every day, I interact with dozens of members from all corners of logistics and have been greatly impressed by the industry’s resilience and capacity to innovate. Having said that, I still find myself bumping up against a common barrier when it comes to managers taking action to reduce their company’s environmental impacts: “I can’t afford it,” they tell me. Or, “I need to focus on my bottom line.”

Yet, every day, new stories emerge about companies reaping the business benefits of going green. I chalk up this gap between perception and reality to outdated thinking: perceptions rooted in a time when a company had to invest a lot of money to comply with environmental regulation. This used to be true, but the business case for going green continues to evolve rapidly. “The biggest misperception in the logistics industry is that sustainability is going to cost something when, in fact, it often doesn’t,” explains Jim Eckler, president of Eckler Associates in Toronto and a long-time SCL member. “It actually saves money.” With supply chain management becoming ever more critical to the success of any business strategy, logistics organizations need to explore the role environmental and social sustainability can play toward enhancing competitiveness.

At SCL, we recognize the value of greening your operations, and continue to expand our education programming — developing opportunities, tools and resources (such as this report) to help senior managers realize the promise of green business. A hallmark of our ever-evolving program is to showcase best-in-class examples from warehouse operators, trucking companies and companies involved in other modes of transportation that are successfully working to achieve the environmental sustainability performance their customers are looking for. Over and over again, these companies teach us that going green is not only helping them meet supplier guidelines related to green, it is also attracting new customers.

As your industry association, we will continue to demonstrate the real-life value of integrating environmental thinking into all aspects of supply chain and logistics management, including distribution and transportation.

I am personally motivated by the knowledge that our industry has the necessary bench strength to proactively work towards solving the sustainability challenge we all face. I would like to challenge you, our members, to undertake to fully understand the latest issues and developments, and reap the benefits of a greener business for years to come.
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As international trade grows, so too does the need for companies to create more focused and resilient supply chains: logistics and transport have moved from the backroom to the boardroom to become a competitive differentiator, critical for business success.

With responsibility for the efficient flow of billions of dollars worth of materials and goods from point-of-origin to point-of-consumption worldwide, logistics and transport also have a key role to play in solving the environmental sustainability challenge.

The industry deserves recognition for significant steps already taken to reduce environmental impacts — in particular, efforts related to the reduction of harmful air emissions. In doing so, the sector has also begun to enhance value, both within organizations and across global supply chains. Still, there is much to be done, and quickly. “Sustainability is no longer a nice-to-do for logistics companies,” says Brett Wills, senior consultant for High Performance Solutions Inc. in Kitchener, Ontario. “It is a critical component to competing and winning in 2011 and beyond.”

To remain competitive in an increasingly complex global business environment, Canadian distribution and transportation service firms must leverage technology, and strive to continually improve by offering new and innovative business processes. Smart organizations will capture market advantage by better understanding the impacts of their business and leveraging opportunities to drive efficiencies while offering environmentally-related performance metric tools and services to help customers make informed decisions.

This report is aimed at deepening executive understanding of the top five environmental issues relevant to the logistics sector, with a focus on the business risks and opportunities currently associated with each issue — all outlined in a user-friendly Executive Dashboard style. Each section of the Dashboard includes brief case studies showcasing the latest industry innovations and inspired leadership within logistics today. Finally, at the end of this report, you will find suggested resources — websites, tools and guides to help you continue learning.
Drivers of Change

In the 1950s and 1960s, ready access to a reliable supply of inexpensive gasoline, diesel and bunker fuels enabled international trade to grow exponentially, creating demand for an exciting new industry: global logistics. However, inexpensive oil has become a relic of the past — and no one knows this more than the professionals in logistics and transportation. Even so, rising fuel prices are just one of the factors driving the current greening of the industry. Looking closer, the drivers of this greening are, in fact, a complex mix of interconnected trends and themes that include the quest for energy security, the urgent need to address climate change, a growing global middle class and the rising demand for finite natural resources (a.k.a. “the sustainability challenge”). The result is increasingly environmentally sensitive supply chains.

The Sustainability Challenge

By the end of 2011, we will be seven billion people here on planet earth, rising to around 10 billion sometime around 2081. Such staggering forecasts beg the question: how will we be able to provide enough food, water, shelter and medical care for three billion more in less than a lifetime? Climate change, largely the result of human activities such as the burning of fossil fuels for transportation and energy, is only expected to deepen the problem.

Despite mitigation efforts, greenhouse gases (GHGs) such as carbon dioxide (CO₂) continue to build up in the earth’s atmosphere. As of August 2011, atmospheric CO₂ levels were at 390.02 parts per million (ppm), compared with only 280 ppm before the Industrial Revolution. More CO₂ and other GHGs are in the atmosphere than can be naturally “recycled” or neutralized through our forests, soil and oceans. The build-up in GHGs is causing global temperatures to rise. In fact, Canadian temperatures are increasing faster than the global average, with an average 1.3°C rise in temperatures since the mid-20th century.

One effect of this warming is an increase in the frequency and severity of weather events such as floods, droughts and storms. Adaptation to such stark new realities continues to present new challenges.

At the same time, a fast-growing middle class in developing countries such as India and China is increasing demand for goods, transportation and energy, further exacerbating our environmental problems. In China alone, another 220 million vehicles are expected to hit already packed roads between now and 2020: last summer, congestion caused a highway traffic jam more than 100 kilometres long and lasting nearly two weeks.

The need to address climate change is driving much speculation about CO₂ regulations, as well as GHG-reduction strategies on every level, in a global push toward the development of a low-carbon economy: naturally, transport is a key area of focus. In fact, transportation in Canada is responsible for approximately 27% of the country’s GHG emissions, with trucking being among the biggest contributors. Also, with over 50% of the average corporation’s CO₂ emissions occurring within the company supply chain, expect companies to continue to scrutinize their logistics and transportation activities for ways to “decarbonize” and reduce risks. In addition, other regulation, rules and policies aimed at protecting waterways, biodiversity, human health and well-being continue to be developed.

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Traversing thousands of miles across land, sea and sky to move billions of dollars worth of goods, the logistics industry plays a large role in our global dependence on fossil fuel. Heavy trucks in Canada accounted for 21.9 billion vehicle-kilometres in 2006, with another 7.4 billion vehicle-kilometres racked up for medium-sized trucks. In the United States, trucking burns 54 billion gallons of fuel each year. Marine shipping, rail and air transport also consume billions of gallons of increasingly expensive fuel each year.

While progress continues to be made in using alternative sources of energy — including natural gas, biofuels and renewable power sources such as wind and solar — our current fossil-fuel-based energy infrastructure will ensure dependency on oil for a number of decades.
Concerned about risks and opportunities related to climate change and water and energy security, customers, employees, investors, regulators, not-for-profits and communities are pressing for greater environmental disclosure from the businesses they interact with. To satisfy this demand for information, many firms are asking their suppliers to help them evaluate the environmental impacts of their products across their life cycle, from raw material extraction straight through to disposal.

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In the same vein, companies are evolving their thinking beyond traditional supply chain performance metrics, such as on-time delivery and damage-free delivery, to track environmentally related key performance indicators (KPIs) pertaining to waste and water management, often aided by data-capture technology. In doing so, many find that improving their environmental performance can often reduce costs too.

For companies like RBC, Walmart, P&G and Honda, procurement practices increasingly incorporate information related to the supplier’s management of environmental sustainability issues. Companies can share this information with interested stakeholders, while better understanding the environmental and social impacts on a supply chain basis.

Finally, at the leading edge is the valuation of the “ecosystem services” that nature provides, such as fresh water and clean air, traditionally considered to be “externalities” and, therefore, not reflected on a company’s balance sheet. However, there is a growing recognition that business both depends on, and impacts, ecosystem services. With this new thinking, many have begun to seek ways to better understand and manage ecosystem-related risks and opportunities. In the future, expect this consideration of ecosystem services to drive demand for greater environmental performance — and associated metrics — in all aspects of business, including logistics and transport.

**Drivers of change: Case study**

**ACCOUNTING FOR ECOSYSTEM SERVICES AT PUMA WITH AN EP&L**

Believed to be a world’s first, Germany’s Puma AG has developed an Environmental Profit & Loss (EP&L) statement, valuing the company’s total direct and indirect environmental impacts caused by its greenhouse gas emissions and water consumption at 94.4 million. Of that amount, the company estimated the direct ecological impact of its operations, including warehousing and logistics services, to be 7.2 million. The remaining 87.2 million is attributed to the four tiers of its supply chain: product manufacturing, outsourced processes, raw materials processing and raw material production. “The EP&L statement is … an essential tool and a shift in how companies can and should account for and, ultimately, integrate into business models, the true costs of their reliance on ecosystem services. …” said Jochen Zeitz, chairman and CEO of Puma AG and chief sustainability officer of Puma’s parent company, PPR Home in a May 16, 2011 statement. “Gaining a better understanding of the source of the natural goods and services Puma relies on, and the declining availability of the basic resources required for our business growth, will help Puma build a more resilient and sustainable business model and ultimately better manage its impacts on the environment.” By putting a monetary value on its environmental impacts, the company says it is not only preparing for potential future legislation such as disclosure requirements, but can also use the costs as a metric upon which to gauge environmental performance with traditional business metrics.

Weather: Planning for uncertainty

What would happen to your business if a port in a key trade lane was hit by a Category 5 hurricane twice in the same year? Or if a flood submerged the town where your warehouse is located? Or a tornado damaged your distribution centre (DC)? Just a few years ago, the odds of such extreme, once-in-a-lifetime types of weather events impacting your business were relatively low — but no more. Due to global climate change, we continue to experience a higher frequency of severe weather incidents — weather-related insurance claims have increased by 15-fold over the last three decades, according to one insurer — and the worst is yet to come. While insurance may cover part of these costs, it cannot cover everything, including damaged relationships with your clients should your business falter because of an extreme weather-related event.

The globalization of the logistics and transportation industry makes it particularly vulnerable to the physical impacts of climate change. Potential weather-related impacts will depend on activity and region — and can impact all modes of transportation. For example, Canadian Pacific Railway Ltd. says multiple, weather-related events, including avalanches, caused significant disruptions to its train operations in the first quarter of 2011.

While it is impossible to predict with any certainty what, where and when extreme weather events will strike, it is possible to prepare to adapt: to create or review existing business continuity and/or disaster preparedness plans and to review insurance coverage to ensure your business is adequately protected.

“Companies have to make sure that they not only have a Plan A, but also a Plan B, C and D in case disaster strikes,” says Jordi Avellaneda, global head of Green Logistics, Supply Chain Development for Damco in Copenhagen, Denmark. “Going forward, more companies are going to be saying, ‘Okay, last year it was volcanoes, this year it’s Japan, the floods and tornadoes. What’s coming next and how will we deal with that? Do we have to go to multi-sourcing countries? Diversifying routes? Do we have to look at different ways of transporting goods?’ End-to-end supply chains are so huge and long — many companies are realizing they have to plan for the unexpected.”

Computer simulation is one way for businesses to forecast the downstream effects of severe weather incidents and make better decisions. “With simulation, you can try out different scenarios in a risk-free environment,” says Alexandre Ouellet, director, Modelling Solutions, for Montreal, Quebec-based Trellisys Technologies Inc.
Simulation has helped a port authority better prepare for extreme weather by modelling the impact of hurricanes hitting its harbour.

Information technology plays a critical role in executing any plan, so you should make sure that, when disaster strikes, your business is protected. Maintaining a resilient business may include a cloud-computing strategy. Distributed computing platforms that make your data, processes and applications accessible from a virtual “cloud” versus having them locked away in a single physical location at your office will help safeguard information and ensure that “it is available wherever, whenever required,” says John Weigelt, national technology officer for Microsoft Canada, Mississauga, Ontario. “Making sure data is accessible on smart phones and tablet computers enables staff to work wherever and whenever they are when extreme weather strikes.”

On the flipside, Canadian logistics practitioners should also consider opportunities in a warming climate. For example, warmer weather could improve winter road conditions for trucking.17 Also, as rising temperatures melt Arctic ice, increasingly open waters could permit new trade lanes. When the earth’s average temperature reaches about 2°C over pre-industrial levels, the Northwest Passage, a series of channels linking the Pacific and Atlantic oceans, could be accessible — and attractive — for commercial shipping. The Northwest Passage is approximately 7,000 kilometres shorter than the shipping route used today through the Panama Canal, shaving off about two weeks of travel time between London and Tokyo.18

**Weather: Case study**

**FLOODS BOOST LOGISTICS COSTS FOR CHIQUITA**

In its 2009 annual filing with the U.S. Securities and Exchange Commission (SEC), Chiquita Brands International, Inc., a global producer and distributor of bananas and other produce, disclosed that its operations were “significantly impacted” by weather-related events. Flooding at farms in Costa Rica and Panama in December 2008 incurred approximately $33 million of higher costs, including logistics related to procurement of replacement fruit from other sources. Chiquita further disclosed it experienced “interruptions, port damage and changes in shipping routes as result of weather-related disruptions” and that “an extended interruption in our ability to ship and distribute our products could have a material adverse effect” on the company.19 The company was presented with a 2009 Circle of Excellence award from the Distribution Business Management Association for its efforts toward sustainability in supply chain logistics, which included participating in a study with MIT Center for Transportation & Logistics to reduce the carbon footprint of its supply chain.20

WORLD MAP OF NATURAL CATASTROPHES FOR FIRST HALF OF 2011

- **Natural catastrophes**
- **Geophysical events** (earthquake, tsunami, volcanic activity)
- **Hydrological events** (flood, mass movement)
- **Meteorological events** (storm)
- **Climatological events** (extreme temperature, drought, wildfire)

Source: Munich Re, Geo Risks Research, NatCatSERVICE
Logistics firms, like all other businesses, rely on a complex energy system to ensure a constant supply of power to their facilities. Energy is predominantly derived from fossil fuels, biofuels and electricity and, no matter the source, the use of energy impacts the environment, albeit in different ways.

The combustion of fossil fuels for transportation, power generation, and space and water heating releases GHGs including CO₂ into the atmosphere, which accumulate to cause global warming.

Biofuels can be derived from a range of sources, and while their combustion is considered GHG-neutral (CO₂ is absorbed as plants grow and then released when biofuels are burned), they may have negative environmental implications, such as when biofuel use drives up demand for valuable farmland that could be used to grow crops for food instead of for transportation fuel.

Electricity's environmental impact depends on its source as it can be generated using fossil or nuclear fuels, or renewable sources such as hydro power, wind, solar, geothermal, biofuels and hydrogen. The majority of Canada's energy comes from hydro power, but GHG-emitting fossil fuels are also required.

The good news is that the average warehouse and distribution centre is typically full of opportunities to improve environmental performance and reduce costs by saving energy. Here are three key approaches: 1) Use less; 2) Improve the energy efficiency of processes and equipment to produce the same output with less energy; and 3) Use more renewable energy — either by generating your own green energy on-site or by purchasing green energy from a third-party provider. On-site renewable energy generation can improve energy security and reduce environmental impacts. It can also be a source of revenue in provinces as a result of incentives such as Ontario's Feed-in-Tariff (FIT) for solar and other types of renewable power.

An energy audit is a good place to start, as it will enable you to identify hidden energy hogs within your warehouses and DCs, and other high-impact areas for prioritization. Simple actions such as turning off equipment when not in use can make a big difference. For instance, an investment in the replacement of conventional fluorescent lighting with more energy efficient lighting can pay off quickly: according to Natural Resources Canada's Office of Energy Efficiency, a 25% internal rate of return or better can be achieved through energy savings on lighting retrofits. There are a variety of experts to help you — ranging from in-house experts to manufacturers of lighting and other equipment to third-party energy and sustainability consultants.
Energy: Case studies

HYDROGEN FUEL CELLS LIFT ROI AT WALMART DC

In 2009, Walmart set out to build the world’s most sustainable refrigerated distribution centre in Balzac, Alberta — a goal that aligned with a long-term vision to be supplied by 100% renewable energy. The second goal, to do it at the lowest-cost possible, aligns with the global retailer’s “everyday low cost” operating model. “Everything we did in Balzac has a compelling return on investment and environmental sustainability strategies allowed us to do that,” says Virginia Garbutt, director, Strategic Network Planning and Improvement for Walmart Canada Corp. in Mississauga, Ontario.

The DC opened in November 2010 and is 60% more energy-efficient than others operated by Walmart. Designed to be a living lab of sustainability, the facility features numerous innovative technologies, such as hydrogen fuel cells to power its material-handling fleet of pallet trucks.

Producing only heat and water as by-products, the hydrogen fuel cells replace traditional lead acid batteries in the DC’s fleet of pallet trucks. Walmart sources the hydrogen from Quebec hydropower so it is produced using 98% renewable energy sources. While transport from Quebec to Balzac does generate carbon dioxide and other GHG emissions, the total emissions are lower than if the batteries were charged by a non-renewable energy source.

At between $20,000 and $30,000 for a single battery in a pallet truck, the hydrogen-fuel cell batteries are not inexpensive but the ROI is solid. Garbutt points out that you only need one-per-truck versus the two- to three-batteries-per-forklift previously required. In addition, by opting for hydrogen fuel cells, Walmart avoided the cost of building an additional 200-square-foot warehouse space dedicated to lead-acid battery charging and cooling.

A reduction in operating hours (it takes less time to refuel a pallet truck than it takes to change a battery in the traditional method), and a reduction in maintenance requirements, is expected to deliver over $1.3 million in operational savings over five years from the use of hydrogen fuel cell pallet trucks at Balzac — a figure Walmart expects to fully realize, says Garbutt.

Walmart Canada is partnering with the Canadian Hydrogen and Fuel Association to help make hydrogen a viable alternative for other Canadian businesses — including their own. “Our ROI will grow if the hydrogen fuel cell industry grows. As more businesses use this technology the cost of the fuels cells will drop, so that’s the risk we took,” explains Garbutt. “We’re willing to be first to market to demonstrate to the industry, even our competitors, that green technologies are cost-effective.”

GEOTHERMAL SAVINGS AT LANGE TRANSPORT

In late 2006, Lange Transport installed a geothermal energy heating and cooling system for its 70,000-square-foot, 30-year-old building in an effort to stem a $5,600-a-month natural gas bill, according to a GTAA Partners in Project Green case study. The $560,000 investment, which has a six-year payback, has eliminated the hefty natural gas bills and reduced carbon dioxide emissions by 158,000 tonnes.

SIX-DIGIT SAVINGS FROM ENERGY RETROFIT AT VISTA CARGO

A recent $1.4 million energy retrofit at Vista Cargo Terminals Inc. is guaranteed to reduce its hydro and gas costs by $177,904 per year, for 10 years. The retrofit of the 430,000-square-foot warehousing complex included the installation of new high-efficiency boilers and heaters, heat pumps and high-bay heaters, an electronic data control system for equipment, a power modulator system, and new T8 lighting throughout. Another project was to install UV film on the windows. “With the UV film, the overall air conditioning has improved dramatically,” says Robert MacKechnie, manager, Building Operations in Mississauga, Ontario.

LIGHTS ON FOR LESS AT UNISOURCE CANADA

A bold lighting retrofit at three Toronto-based DCs reduced operating costs by $250,000 for Unisource Canada Inc. The original proposal to switch to more energy efficient T8 fluorescents called for a two-year-plus payback: too long, said Unisource, and went back to the drawing board for a 10-month payback. “It wasn’t a matter of minimizing the investment, but actually spending more by outfitting the new lighting fixtures with occupancy sensors,” says Andrew Gustyn, corporate sustainability manager. Unisource also leveraged its warehouse management systems to mine time-of-use data to support its business case.
Emissions: Improving air quality through cleaner transport

Increasing levels of GHGs are causing changes to our climate that affect people, business, biodiversity and the ecosystem services we all depend on. Nationwide, emissions from transportation make up 27% of Canada’s total GHG emissions. However, GHGs, including CO₂, are just one of a plethora of air pollutants of concern. Emissions such as nitrous oxides (NOₓ), sulphur oxides (SOₓ) carbon monoxide (CO), volatile organic compounds (VOCs) and particulate matter (PM) all contribute to poor air quality and have caused negative impacts on human health.

For logistics and transportation practitioners, there are many business risks and opportunities related to air emissions — one of which is the regulatory uncertainty related to the implementation of a carbon tax or cap-and-trade program. By reducing or eliminating direct and indirect carbon dioxide emissions, companies can comply with increasingly strict air quality regulations in Canada and the United States.

Environmental performance can be improved through careful evaluation of transportation modes, as CO₂ emissions vary (see figure 1). In fact, changes in transportation modes alone could trim supply chain energy usage by 4% by 2020. Over time, expect improvements as innovation continues. Here is a brief overview of emissions-related efforts and innovation by mode (truck, marine, rail and air).

**Truck transport**

A good news story for truck transport is the development of the near-zero emission truck engine, the result of a 10-year regulatory collaboration between the U.S. Environmental Protection Agency (EPA) and Environment Canada. “Long story short, during that time we have attained the virtual elimination of PM₁₀ and NOₓ from truck engines,” says Stephen Laskowski, senior vice-president, Canadian Trucking Alliance in Ottawa. He also notes that SOₓ emissions have dramatically declined, thanks to stringent, ultralow sulphur diesel fuel requirements that began in 2007. “So as far as NOₓ, SOₓ and PM₁₀ in the freight modes go, no one runs a cleaner engine than trucking,” says Laskowski. “The air emissions coming out of a truck these days are cleaner than the air in most urban centers, if you measured it.”
The flip side to the near-zero emission engine is that it consumes more fuel. This means that while older trucks may be dirtier from an air quality perspective, overall, they emit fewer GHGs because they are between 3 and 8% more fuel-efficient, says Laskowski.

**GHG Protocol — Direct versus indirect emissions**

As you deepen your knowledge about environmental sustainability issues, you are likely to hear emissions described as Scope 1, 2 or 3. What does this mean? The Greenhouse Gas Protocol (www.ghgprotocol.org) is the most widely used international accounting tool for government and business to understand, quantify and manage greenhouse gas emissions. The Protocol was developed by the World Resources Institute (WRI) and World Business Council for Sustainable Development and outlines the three scopes of emissions as follows:

- **Scope 1:** All direct GHG emissions, i.e., from sources that you own or control, such as your fleet of trucks or the gas furnace in your warehouse.
- **Scope 2:** Indirect GHG emissions from consumption of purchased electricity, heat or steam, in your head office and warehouses, for example.
- **Scope 3:** Other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by you, electricity-related activities (e.g. transmission and distribution losses) not covered in Scope 2, outsourced activities, waste disposal, etc.

It is worth noting that for many logistics companies, their own Scope 1 and 2 emissions will represent their clients’ Scope 3 emissions.

To help you better understand CO₂-related business issues, RBC has prepared an article, “Understanding Carbon Risks”, free to download from www.rbc.com/business-advice.

Another driver of change is the California Air Resources Board (CARB) Tractor-Trailer Greenhouse Gas Reduction Regulation of 2010.³⁰ The new standards apply to the owners of certain tractors and trailers driven on California highways — regardless of where the vehicle is registered — and require, among other things, the use of SmartWay certification from the EPA. The regulation will further reduce GHG emissions by improving tractor and trailer aerodynamics, and tire-rolling resistance.

In urban freight, there is a move to add more hybrid and electric vehicles to the fleet mix. Novex Couriers in Vancouver owned the first two electric delivery trucks in Canada, and is committed to switching completely to

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*Best-in-Class (BIC) businesses are defined as businesses that achieve positive environmental benefits in the two main sector-specific GSCM (Green Supply Chain Management) practices.*
hybrid, electric or alternative fuel vehicles by 2015, says president Ken Johnston. Food producer Frito-Lay Canada began adding fully electric, zero-emissions delivery vehicles to its Toronto-area fleet in April 2010.31 While expensive, the plug-in trucks use only about $400 worth of electricity per year, compared to the over $10,000 worth of fuel such a truck would normally consume.

**Marine transport**

The marine mode is great for optimizing supply chains because of its ability to mass transport goods with tremendous energy efficiency. It is also relatively clean in comparison to other modes, emitting less CO₂ per tonne-kilometre than air or truck transport, says David Bolduc, executive director of Green Marine in Quebec City, Quebec.32 Having said that, with 90% of global trade shipped by sea, the marine mode as a whole still has a significant environmental impact. Plus, marine transport uses heavier fuels, which emit more SOₓ, NOₓ and PM than air or truck transport fuels when burned. According to ongoing research33 being conducted by the United Nations International Maritime Organization (IMO), international shipping is estimated to have emitted 870 million tonnes, or about 2.7%, of the global human-made emissions of CO₂ in 2007.34 IMO research indicates technical and operational measures could significantly increase efficiency and reduce the emissions rate by 25% to 75% below current levels.

Interestingly, international marine shipping — and aviation — are the only two industries not covered by the 1997 Kyoto Protocol because their GHG emissions cannot be pinned down to any particular country.35 Despite no emission-reduction targets, industry players are proactively collaborating for a cleaner marine mode to minimize other emissions and to prepare for potential future GHG regulation. Among their self-regulatory efforts is an Emissions Control Area to be implemented by the IMO in North America in 2012, with much lower limits on sulphur content in marine fuels.

Individually, marine transport providers are doing more to reduce emissions on a ship-by-ship basis through technology, fuel alternatives and operating practices such as simply slowing down. Maersk Line has a game changer with its recently announced Triple E class of ships touted as the world’s largest and most energy efficient.36 The new ships — each able to carry 18,000 TEUs (twenty-foot containers) — will cut GHG emissions by 50% compared to the industry average, providing a CO₂ savings of 2.5 tonnes per container on a one-way trip between Asia and Europe.

To better understand their CO₂ footprints, logistics companies are finding competitive advantage in offering customers detailed carbon emission information — so shop around. Damco, for instance, offers services to help businesses track CO₂ emissions across their supply chains in all transportation modes with its Supply Chain Carbon Dashboard. Similarly, Kuehne + Nagel helps clients make better decisions by providing emissions reports across all modes with its Global Transport Carbon Calculator.

**Rail transport**

Rail is also doing its part, but with a built-in competitive advantage over other modes. “Of the surface modes, rail is inherently more efficient than trucks and it goes back to theoretical physics,” says a former railroader, Bob Ballantyne, now president of the Canadian Industrial Transportation Association (CITA) in Ottawa, Ontario. “The rolling resistance between a steel wheel and a steel rail is very low and, therefore, it takes less energy to overcome, plus, you can string a whole lot of vehicles together. Railways are now running trains well over a mile long.”

Mid-train power, with locomotives spaced throughout the train, instead of stacked all at the front, he says, have not only enabled railways to run longer trains, but have also helped reduce the environmental footprint of rail. “It’s these improvements in productivity that are also resulting in improvements in air quality,” he adds.

Like trucks, train diesel locomotive engines are also becoming more efficient so as to require less fuel. Other eco-minded initiatives include use of idle-reduction technologies, hybrid locomotives and top-of-rail friction modifiers.37 According to the Railway Association of Canada, a train can move a tonne of freight 169 km on a single litre of fuel. The result: two-thirds of all freight in Canada by volume is moved by rail, but is only responsible for 3% of all surface transport GHG emissions.38

Ultimately, rail offers many environmental benefits over other modes and is worth a second look if it is not already being utilized for your transport and logistics needs.

**Air transport**

Currently, air transport is the biggest emitter of CO₂ per tonne-kilometre among all four major modes of transport, and faces significant challenges to greening its business; nonetheless, the airline industry continues to work steadily to improve its environmental performance.

Airlines are spending billions to lower fuel costs and demonstrate their commitment to sustainability by upgrading their fleets with new, lighter and more efficient aircraft, answering the call from shippers to go green. In Canada and the U.S., much of the reductions in GHG emissions evident today are a direct result of industry efforts and initiatives such as the Memorandum of
Understanding (MOU) between Canadian air carriers and Transport Canada signed on June 19, 2005. The first of its kind in the world, the voluntary MOU aims to encourage National Airlines Council of Canada (NACC) members, a trade association, to improve the fuel efficiency of their fleets and collectively reduce the emission of GHGs on a per unit basis.39

The IATA, an international trade body representing over 230 airlines, also says its members have increased fuel efficiency and reduced CO₂ emissions, establishing an ambitious vision to achieve carbon neutral growth by 2020, and halve emissions by 2050 when compared to 2005, noting that “no other industry has made such commitments at a global level.”40 The industry also set a visionary goal to build a zero-emissions commercial aircraft within 50 years.41

Steps taken to achieve reduced emissions include aircraft modifications — such as the installation of ozone scrubbers, which enable aircraft to fly at higher, more optimum altitudes thereby reducing fuel burn; enhanced performance kits to improve engine fuel efficiency; lighter-weight tires; engine washing maintenance programs to improve performance; as well as fuel-conservation training and development programs for pilots and key personnel.42

Airlines are also researching the use of alternative fuel sources. Biofuel derived from natural biomass sources, such as algae, jatropha and camelina, show great promise to reduce CO₂ emissions and have already been tested and proven to work, says the IATA. If commercial aviation were to switch 6% of their total fuel use to biofuels by 2020, the industry would reduce its carbon footprint by 5%.43

Aircraft design is becoming more aerodynamic, and using more fuel-efficient engines. Boeing’s new 787 Dreamliner, for instance, is the first commercial jet airplane to have a lighter, all-composite structure, says the company. This, coupled with advances in engine and wing design, results in a 20% reduction in fuel consumption and CO₂ emissions, and 28% less NOₓ emissions than 2008 industry limits, relative to the company’s 767 aircraft.44

As every airline is different, logistics and transport professionals should review an individual carrier’s environmental performance. Also, optimize air mode transport by seeking routes to ship direct; connecting flights take longer and typically have a greater environmental impact due to the extra fuel required for additional take-offs.45 Packaging optimization will also help to reduce emissions of your shipments as the heavier the item, the more fuel usage and emissions required to transport it.

One study found that if all passengers on U.S. domestic flights were to pack five pounds less, the industry would save 64 million gallons of jet fuel each year and have a climate impact equal to the grounding of all domestic flights in America for three days.46 The same result could probably be achieved if shippers also reduced their packaging weights by five pounds per year.

**Emissions: Case study**

**CARBON-INDUCED COMPETITIVE ADVANTAGE AT LAKESIDE LOGISTICS**

In four short years, Lakeside Logistics transformed itself into an environmental leader in the Canadian logistics industry by becoming a provider of education, information and metrics that enabled its customers to quantify — and ultimately reduce — their carbon footprints. Among its green accomplishments, Lakeside was the first third-party logistics provider to become carbon-neutral and developed a Vision Green website aimed at providing environmental information for carriers and customers. In 2007, the company joined the EPA’s progressive SmartWay Transport Partnership and now has over 100 carriers onboard. Customers can track CO₂ emissions related to their transport with a customizable dashboard tool — and the innovation continues. “We really look at this as a value-add for our customers,” says Susan Moore, director, Sustainability for Lakeside Logistics in Oakville, Ontario. “Our competency is logistics, but helping customers navigate the environmental landscape as it relates to carbon is increasingly just part of what we do.”
Water appears to be a plentiful and secure resource in Canada, a country with seemingly abundant lakes and rivers. While Canada does have 20% of the world’s freshwater supply — it is not always located where it is wanted or needed: already there are signs of water scarcity in many areas, including the prairie regions in Alberta and Saskatchewan.47

In addition to regional water scarcity and low water levels, water quality is also a concern. Water pollution in lakes, rivers, oceans and groundwater can stem from a variety of sources related to logistics and transport activities. In the marine mode, for instance, oily water from ships’ operations can contaminate water bodies harming flora and fauna. Green Marine, a voluntary environmental program for the Canadian and American Marine industry, is currently working to develop and implement best practices to help its members eliminate oily water spills. Cargo residues from bulk cargo, such as minerals, grain, salt, sugar and coal, are being tackled by Green Marine. When ships switch from carrying one type of solid bulk cargo to another, their holds are swept and rinsed with water to avoid cross-contamination and this waste water may be discharged into the sea along with cargo residues. Over time, these cargo residues may accumulate, and their deposits may disrupt marine wildlife habitats. The Great Lakes are especially vulnerable given their lack of deepwater currents, which could disperse the cargo residues.48 Similarly, truck and rail may also pollute water bodies with cargo residues.

Stormwater run-off in areas around DCs and transportation terminals can also contaminate surface and groundwater through spills of aviation fuel, diesel fuel, gasoline, and hydraulic and motor oil.49 Such water-impact spills can be caused for a variety of reasons, according to one study of the Etobicoke Creek Watershed in Ontario, including equipment failure, damage by moving equipment containers, pipe and hose leaks and overflows.50 At airports, glycol from aircraft de-icing activities and the washing of planes can also lead to ground and surface water contamination and, therefore, steps should be taken to contain and even reuse these potential hazardous substances.
Water issues can challenge transport and logistics companies in other ways, ranging from increased costs of water supplies to more stakeholder requests for information about water management strategies. But good water management can provide additional benefits. Walmart Canada’s sustainable distribution centre in Balzac, Alberta, is piloting silver cathode technology to clean its waste water, virtually eliminating the need to purchase, store and manage chemicals normally required to clean it before discharge.

In addition to programs and policies to protect water quality, companies are also taking many steps to reduce water use, ranging from installation of water-efficient toilets and taps to use of drought-resistant landscaping to creation of systems to enable water to be captured and reused. A water audit will help you to identify your company’s water usage and water quality impacts, data that can then be used to develop internal water management strategies and set goals, as well as measure and report progress along the way.

New U.S.-based regulation aims to prevent the introduction of invasive species via ballast water in New York waterways. As of January 2012, all vessels transitioning into the Great Lakes via the St. Lawrence Seaway must use technology to clean ballast water to levels far greater than current standards. Non-compliant ships could be prevented from passing through New York and thus, the St. Lawrence Seaway, Great Lakes and all of the ports and industry in the system. Many industry representatives are concerned about the regulation because the technology required to comply with this strict ballast water regulation is not yet available. While the outcome of this ballast water issue is not yet clear, the underlying message is that regulation related to the protection of water does not stop at our borders, and is certain to become more stringent.

**Water: Case study**

**CAPTURING RAINWATER AT KUEHNE+NAGEL**

In its new Mississauga, Ontario, warehouse, Kuehne+Nagel captures stormwater run-off from the roof in underground cisterns for landscaping irrigation. These and other efforts have enabled Kuehne+Nagel to substantially reduce its water costs per square foot: a more than 17% reduction from 2008 to 2010. The statistics are collected using its Global Facility Carbon Calculator tool.

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### Invasive species carried by ballast water harm Great Lakes

Human activities and climate change are the greatest threats worldwide to biodiversity. An additional threat stems from invasive non-native species, which can harm wetland and grassland habitat and marine intertidal areas. International transport across all modes is a contributor to invasive species problems, but particularly the marine mode.

Each year, thousands of tonnes of ballast water (water brought onboard for the purpose of stabilizing ships during loading and unloading) from other regions is introduced into Canadian waters. With this ballast water come potentially invasive, non-native aquatic plant and animal species, posing a threat to Canada’s environment, economy and human health. Economic and ecological losses caused by invasive non-native species, such as the zebra mussel, have been estimated at $5.7 billion annually in Canada’s Great Lakes alone.

According to Green Marine, the St. Lawrence-Great Lakes System has seen the introduction of more than 160 non-native species in the last 200 years, with 65% of species introduced since the opening of the St. Lawrence Seaway in 1959, transported via ballast water on ships from overseas.
Waste: Getting to zero

Whether solid, semi-solid or liquid, hazardous or not — waste consumes valuable land, encroaching upon habitats of wildlife and people, and contributing to air pollution and climate change through its management and transport. It also represents squandered energy and natural resources.

Everyday waste reduction strategies and programs can quickly improve environmental performance and often pay for themselves through decreases in haulage and handling costs, less material input requirements and increased production yields, not to mention potential revenue from using waste for energy generation.

Many companies have established “zero-waste” goals. You should start with a waste audit to identify ways to reduce, recycle and reuse, especially items such as pallets and plastic containers in warehouses. Also, do not overlook the effects of packaging. Damco, for instance, says it typically is able to achieve cost-savings for companies in the range of 10% to 15% through its new packaging optimization service. Supply Chain & Logistics Association Canada suggests logistics companies encourage and incent suppliers to adopt packaging best practices, including reducing packaging volume and weight, as well as changing packaging shape and design to increase the density of shipments. In all transport and logistics activities, care must also be taken to avoid spills of hazardous waste that can contaminate soils. And don’t forget your own office operations: ensure that all e-waste from electronics, such as computers, is safely recycled. Going paperless can also reduce your solid waste output.

For some companies, achieving a zero-waste goal might mean learning to rethink the very idea of waste, viewing it not as something to be disposed of, but as a valuable resource and input for another product or process. For example, Maersk Line’s new Triple-E container shipping fleet of 10 vessels will be designed to be safely disassembled and...
reused, an innovation that could serve as a rudder to drive sustainable change in the entire shipping industry. All materials used to build the new Triple-E vessels will either be biodegradable or recyclable. To make it easier for future shipbuilders to identify and reuse these materials, each Triple-E vessel comes with a cradle-to-cradle “passport,” a living document, describing the material composition of every part of the ship.60

With ample possibilities to turn waste into an opportunity, strategic, integrated waste management is bound to become a critical focal point for logistics in the future.

**Waste: Case studies**

**PACKAGING OPTIMIZATION SAVES MILLIONS AT R.G. BARRY CORPORATION**

Footwear giant R.G. Barry Corporation saved more than $2.5 million just by thinking inside and outside the box. R.G. Barry engaged Jack Ampuja, president and CEO of Supply Chain Optimizers (SCO), to help optimize its packaging as part of a larger turnaround effort. Focusing on packaging, Ampuja discovered that while the recycled corrugate cardboard boxes produced by R.G. Barry’s China-based manufacturers appeared stronger, they were actually heavier and weaker compared to those made in North America. Ampuja sourced a China-based supplier capable of manufacturing cartons to North American standards before optimizing the cartons through a packing redesign. Altogether, the changes resulted in $200,000 savings on R.G. Barry’s total corrugate spend. Cutting the total corrugate spend drove additional savings throughout the supply chain because of reduced costs related to handling and transporting of the optimized packaged goods, which cascaded into even bigger savings: $1.6 million from lower inbound freight costs and $1 million from less ocean container freight and storage space. “To me the victory doesn’t come from that home run,” says Ampuja, “it comes from the whole bunch of singles.”61

**SHRINKING PLASTIC WASTE AT VISTA CARGO**

As the landlord of a multi-modal cargo terminal near Toronto’s airport, Vista Cargo Terminals Inc. is responsible for tenants’ waste disposal. When they were looking for ways to become greener and reduce costs, it was hard for them to ignore the ever-increasing stream of shrink wrap, a by-product of air shipping. A solution was found in Efficient Waste Management Services Inc. (EWMS). At no cost to Vista, EWMS installed a compactor in one tenant’s warehouse. Now, every eight weeks, six 500-kilogram cubes of shrink wrap are whisked away for recycling — shrinking the amount of Vista’s waste going to landfill. ■

**WASTE IS TRANSFORMED INTO ENERGY AT NESTLE CANADA DC**

Nestle Canada Inc. has achieved 100% waste diversion from landfill at its distribution centre (which also includes the company’s sales office) operated by Hopewell Logistics Inc. by building a strong relationship with its waste service provider, Wasteco. The waste from the DC and sales office is either recycled or used to create energy. In 2010, Nestle’s energy-from-waste and recycling programs generated 232,112 kilowatt-hours of power, prevented 223 tonnes of GHG emissions and diverted 646 metric tonnes from landfill. ■
Leadership Matters

While it is understandable that you might be overwhelmed by the sustainable business challenge, the key is to get started, and remember: nothing is more powerful than committed leadership. You do not have to be the head of a global logistics or transport business to garner the benefits of going green. Environmental sustainability is scalable. As we have seen from the many examples in this report, companies of all shapes and sizes can — and are — working to reduce their environmental footprint and building more resilient, profitable businesses in the process.

You do need to be aware, however, of the management implications of embedding green strategies into all facets of your business; for instance, consider how an increased focus on environmental sustainability could alter the way you attract and retain employees, including how you make decisions about training and development programs. Experience has shown that engagement of key internal stakeholders is critical to success.

Also, do not underestimate the value of your company’s existing bench strengths — rather, leverage them to address the issues raised by a strategic assessment of the environmental risks and opportunities that lie ahead for your company. Then, combine them with committed executive leadership, and you will be well on the path to achieving a cleaner, greener and more competitive vision for your business.

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Resources

ENERGY

- Supply Chain & Logistics Association Canada and Industry Canada produced an excellent guide, Green Supply Chain Management: Logistics and Transportation Services — A Canada Perspective, which includes energy management practices used by best-in-class companies to improve energy efficiency and reduce distribution costs. Visit www.ic.gc.ca to download the 16-page document.
- The website for Natural Resources Canada (NRCAN) Office of Energy Efficiency offers a host of resources for businesses, including sections aimed at both “Transportation” and “Commercial and Institutional Buildings” and tools and calculators. Visit http://oee.nrcan.gc.ca.
- NRCAN’s CanmetENERGY site includes information about renewable forms of energy, including wind and solar. Visit http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/.
- Pollution Probe produced an excellent Primer on Energy Systems in Canada, free for download at www.pollutionprobe.org/energy/energyliteracy/energy_primer.asp.
- GTAA Partners in Project Green’s website is full of valuable information about going green, no matter where you are located. Visit www.partnersinprojectgreen.com.

EMISSIONS

- Truck: Canadian Trucking Alliance enviroTruck program: visit www.cantruck.com/envirotruck/envirotruck.pdf; EPA’s SmartWay program: visit www.epa.gov/smartwaylogistics/.
- Rail: The Railway Association of Canada (RAC) has an online Rail Freight Greenhouse Gas Calculator to help users determine what impact shipping by rail can have on their emissions; visit www.railcan.ca/environment/calculator. You can also learn more about the Transport Canada — Locomotive Emissions Monitoring Program 2008 at www.tc.gc.ca/eng/programs/environment-ecofreight-about-voluntary-voluntaryagreementsrail-1844.htm;

WATER

- The World Business Council for Sustainable Development (WBCSD) offers a free Global Water Tool to help companies map their water use and assess risks relative to their global operations and supply chains. Visit www.wbcsd.org and click on “Water” under the “Projects” section.
- To better understand water disclosure, see CDP Water Disclosure, a report produced by the Carbon Disclosure Project at www.cdproject.net/water-disclosure.
- RBC is committed to supporting watershed protection and access to clean drinking water through the RBC Blue Water Project®, a 10-year, $50 million grant program. Learn more at http://bluewater.rbc.com.
- Green Marine has developed a self-evaluation guide to help marine carriers reduce the risk of introducing invasive organisms and pathogens via ship’s ballast water. It’s available at www.green-marine.org.

WASTE

- Green Marine has developed a self-evaluation tool to help ports and terminals to better manage their dry bulk handling and storage to avoid waste and contamination. Download it for free at www.green-marine.org.
- The Greening Your Business section of the RBC Commercial Advice Centre has tips on reducing your paper waste and conducting a waste audit, along with a video entitled “Turning garbage into gold.” Visit www.rbc.com/business-advice.

OTHER

- Environment Canada: visit www.ec.gc.ca/air; also find information about Transport Canada’s ecoTRANSPORT strategy, including ecoFREIGHT, a program aimed at reducing the environmental and health effects of freight transport through the use of technology at www.tc.gc.ca/eng/programs/environment-ecotransport-menu-604.htm.
- Supply Chain & Logistics Association Canada offers members a series of free environmental checklists, including Checklist E, which companies may consider when selecting transport service providers for rail, marine and aviation. It includes best practices, examples and case studies: www.sclcanada.org.
- RBC believes that preservation of the environment is fundamental to the sustainability of our communities, our clients and our company. To learn more, please read the RBC Environment Blueprint available at www.rbc.com/environment.
About this report

REPORT ON BUSINESS & THE ENVIRONMENT: LOGISTICS 2012 is the second in a series aimed at helping leaders of Canadian organizations in different sectors better understand and benefit from the risks and opportunities presented by the environmental sustainability challenge. This Logistics 2012 Report is the product of collaboration between two partners — RBC and SCL — in association with ThinkSustain Consulting.

RBC provides personal and commercial banking, wealth management, insurance, corporate, investment banking, and transaction processing services on a global basis. We serve more than 15 million personal, business, public sector, and institutional clients through offices in Canada and 46 other countries. We are committed to proactive and prudent management of the environmental aspects of our business and have had a corporate policy on the environment since 1991. We believe that the preservation of the environment is fundamental to the sustainability of our communities, clients and company. More and more Canadian companies are realizing the significant benefits to be gained by building environmental sustainability into their businesses. To support our clients on this journey, we have created many resources available at www.rbc.com/business-advice.

Supply Chain & Logistics Association Canada (SCL) acts as a significant link within the supply chain community, both nationally and internationally, providing supply chain professionals and their companies access to up-to-date information and resources regarding supply chain management, best-in-class business practices, benchmarking, research and market intelligence. SCL represents a broad spectrum of manufacturers, retailers and service providers who view supply chain management as a critical driver of competitive differentiation, increasing shareholder value.

SCL brings supply chain professionals together in unique forums to learn from each other and industry experts at the regional level through our chapters, as well as through national programs. It is this peer-to-peer education and our members’ passion for supply chain management that sets SCL apart from other organizations and gives business value back to our members.

ThinkSustain Consulting is a Canadian-based boutique consultancy that helps organizations become more environmentally, socially and economically sustainable through strategic planning, communication and stakeholder engagement. For more information, please visit www.thinksustain.com.

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