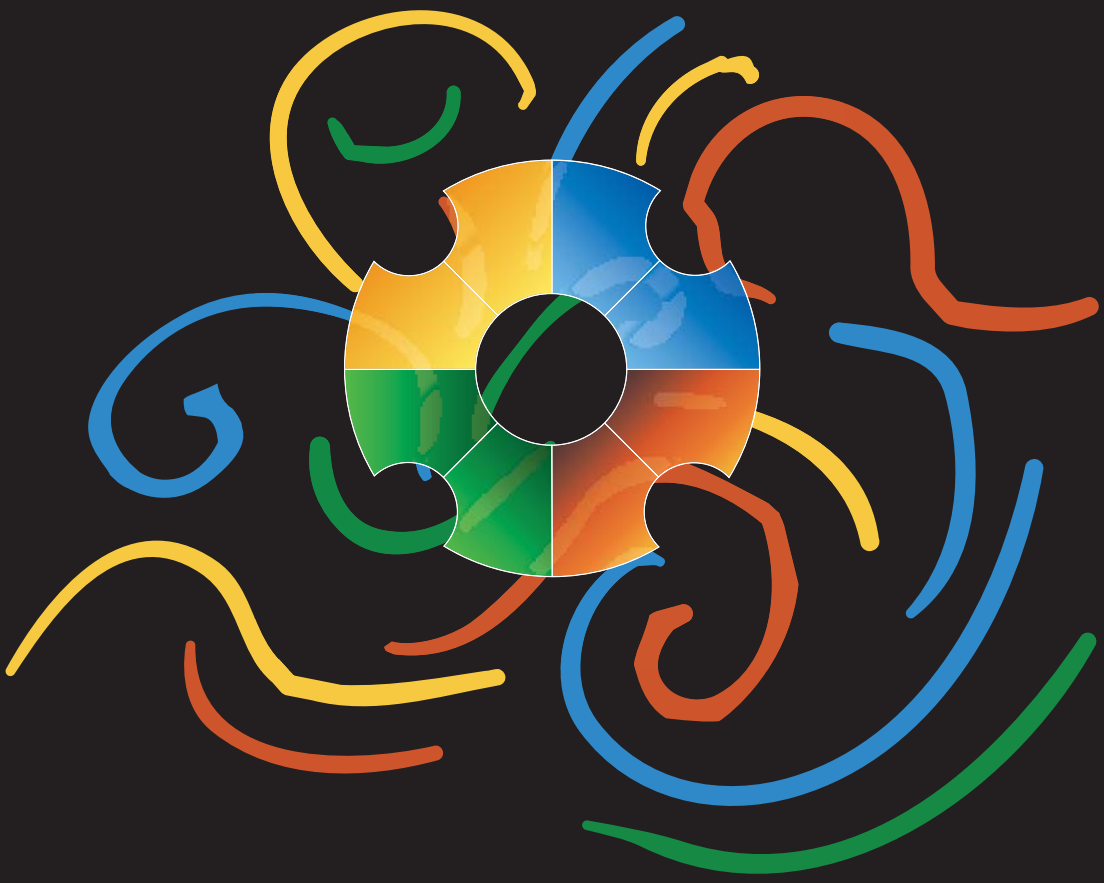
4 Futures



Canadian Natural Resource Processing Industry Challenges

The stories in this book reflect the combined views, best wisdom and creative thinking stimulated by the foresight process of those who participated in the Resource Processing Industries Scenario Planning exercise.

This work was undertaken under the leadership of the Resource Processing Industries Branch of Industry Canada, but does not imply policy, program or regulatory endorsement by Industry Canada unless explicitly indicated. The participants in the Planning exercise regard foresight as contingent research that examines plausible futures that we may have to contend with and as a wise investment in public preparedness.

This publication is also available electronically on the World Wide Web at the following address:

www.nrscenarios.ca

4 FUTURES

Canadian Natural Resource Processing Industry Challenges

How to respond

to environmental demands in a divided world?

How to balance

short and long term interests on environmental issues?

How to position

for significant changes in the natural resources marketplace?

How to grow

the resources sector in a post-consumption society?

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Introduction

The growing complexity of human society and its relationship to the environment presents a major challenge to the world's natural resources industry. This places a premium on effective planning and decision making.

The major issues that will influence our industry's future include:

- the increasing impact of human activity on the environment;
- emerging and/or convergent technologies that promise to solve old problems, while almost certainly creating new ones; and
- the changing ways in which groups and individuals interact with each other globally and locally.

But how can we be sure that our decisions about these issues will keep us on the right path? The short answer is that we can't be certain they will, because we can never foretell exactly how the world will evolve.

Knowledge and certainty

People yearn for certainty. We invest large amounts of time, money and research in projecting our most likely futures. These projections, and the measurements we use to create them, make assumptions about the continuity of our social, political, economic and natural environments. But what if these assumptions turn out to be wrong? What if we measure the wrong things?

This dilemma — the need to construct plausible futures for the resource industry, using imperfect tools and incomplete data — was the genesis of our scenario planning. The planning itself was carried out by a consortium of industry stakeholders and provincial and federal government departments, which undertook the development of four scenarios that would explore the industry's possible futures.

Our core question for this initiative was as follows:

> **How can we ensure the sustainable growth and competitiveness of the Canadian natural resources value chain from the present until 2025?**

We framed the question in terms of value chains, rather than sectors or industries, because we felt that focusing on current industry groupings would repeat the very error we were trying to avoid — namely, of allowing today's perspectives to limit our thinking about the future. For example, the forest industry of 2025 may well be considered an energy industry or a chemical industry. We don't know that this will happen, but we do know that we need to leave such possibilities open. Thus we decided to use the concept of value

chains — that is, the full range of activities by which products are conceived, designed, produced, acquired by their end users and ultimately disposed of.

Developing the scenarios

Scenario planning was first used by the military and later adapted for business, notably by Royal Dutch Shell. By using a structured, logical process to examine a set of future possibilities, scenario planning helps explore the risks and opportunities of a particular course of action, and illuminates the ways in which we might deal with them.

Our approach was to:

- identify and prioritize the key driving forces affecting the industry;
- define two critical uncertainties, each of which presented a high level of uncertainty and could affect the industry in important ways*; and
- explore four possible scenarios based on the intersection of these two critical uncertainties.

Data from stakeholders, together with our own analysis of the literature, identified 15 potential driving forces. For our analysis the two critical uncertainties were:

- society's perspectives on the environment; and
- global dynamics and geopolitical relationships.

** In an interim step, we worked with a third uncertainty (technology) and created eight scenarios.*

We then held a series of workshops, during which we consulted more than 140 knowledgeable individuals and obtained their input about the futures that were likely for Canada, the world and the industry. The outcome was the set of four scenarios presented in this booklet, each representing a possible future. These scenarios, and the dilemmas that are portrayed in them, are:

Garrison States: How do we respond to environmental demands in a divided world?

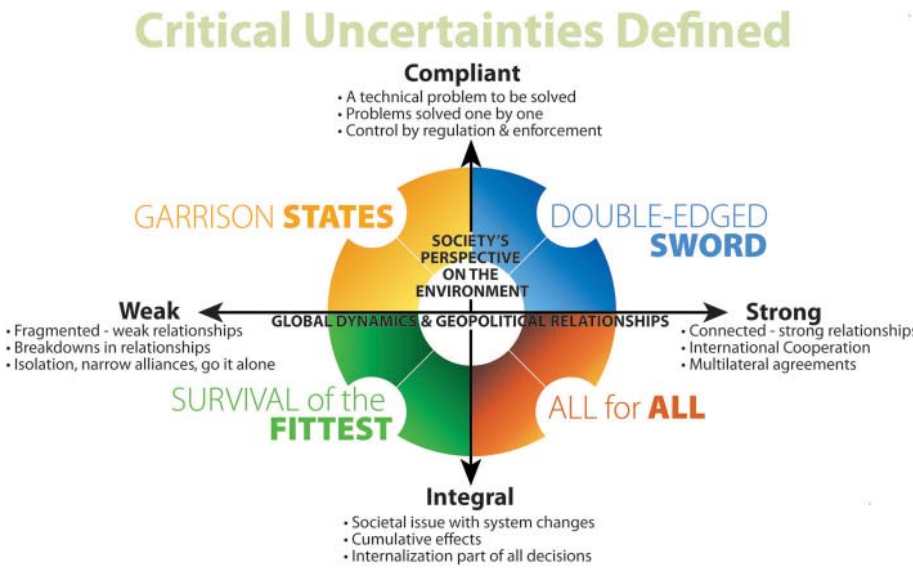
Double-edged Sword: How do we maintain competitiveness while responding to environmental pressures?

Survival of the Fittest: How do we position ourselves for significant changes in the natural resources marketplace?

All for All: How can the resources sector grow in a post-consumption society?

One of our discoveries was that the unpleasant futures were much easier to anticipate than the pleasant ones. Participants often viewed a positive scenario as quite unrealistic, while considering a negative one to be just around the corner.

Finally, a word about presentation. These are not formal reports. Instead, each one is a story that depicts the years between 2008 and 2025, told from the vantage point of a historian writing in early 2026.



Opening the debate

These stories are intended to generate important strategic discussions about the future of Canada's resources sector. They provide a context within which we can challenge assumptions in order to evaluate and improve our normal planning approaches. It must be remembered, though, that these scenarios are not prophecies. Since we have restricted our variables to two, the real world will no doubt have many surprises in store for us.

Further, what actually happens in our scenarios is not as important as the dilemmas they portray and the discussions they are intended to stimulate. There are many questions that need our urgent attention:

- Will we make wise decisions for the long term? Or will we give in to the temptations of expediency and short-term profits, which will enrich us now but impoverish us later?
- Will we adequately consider the common good of our country and our people, or will we allow narrow interests to prevail?
- Are we moving towards a world of continued abundance or emerging scarcity?
- Will we be able to move beyond our history of gaining wealth through the sale of "commodities," and instead begin to add major value to our fundamental resources?
- In a world in which populations assign a brand to a nation or region, how will Canada be perceived?
- Will we ever become true innovators, adept at the commercialization of technology and knowledge, or will we continue to perform below our potential?
- How will the roles and contributions of different industry stakeholders evolve between now and 2025?

Our discussions have made us acutely aware of how deeply dependent Canada is on a functioning global environment. As a country that is an important trading nation despite its small population, our prosperity depends on a safe and secure world.

We hope that these four stories will begin the debate. They are written to be accessible to a wide range of readers and are complemented by our interactive website, www.nrscenarios.ca, which will facilitate continued discussion on the issues and also provide access to other resources. These include a workshop entitled "Exploring Canada's Natural Resources Scenarios," which will help small groups learn how to use the results of our work to explore their own challenges. Signpost indicators, developed to track how the future actually unfolds, will be published on the website regularly for three years.

As you read our stories, we encourage you to think about the issues you are facing in your own organization. For example:

- What assumptions are you making about the world in which you operate?
- Upon which of these assumptions does your business model depend?
- What would happen if one or more of your operation's fundamentals changed significantly?
- How would your organization fare in the futures we have created?
- How would you prepare for the risks or opportunities presented by these futures, or other plausible ones? What new skills would your organization need? What scarcities would you face?
- What must you do to be competitive in our ever-evolving and increasingly complex world?

We hope that you find this process as engaging and worthwhile as we have, and we look forward to your insights and feedback.

1

GARRISON **STATES**

WEAK
Global Dynamics and Geopolitical Relationships

COMPLIANT
Society's Perspective on the Environment

Scenario 1

Environmental dissension, security fears and isolationism fragment the world's economy and cause long-term environmental and social decay

GARRISON **STATES**

Last Saturday I drove out to the farmlands northwest of the city. It was curiosity rather than any errand that took me there; after so many years abroad, I wanted to see for myself if things had changed as much as people had told me.

It had never been choice land for farmers, not like the soft south of the province, but it was late June and the pastures should have been green. Instead they were brown shading to dun, with here and there a patch of emerald where someone was trying to irrigate a kitchen garden. Many fields seemed abandoned, and I saw no cattle. The corn had sprouted, but even I could tell that something was wrong with it. One of the new, climate-driven blights, or an old enemy? It could have been either; there were plenty to choose from.

In the small town where I decided to seek out lunch, even the fast-food outlet had given up and gone elsewhere, leaving its plate-glass windows sealed with plywood.

I went into a store that sold a little, but not much, of everything: hardware, dry goods, nails, pet food, kerosene, toys, sandwiches, coffee.

I was the only customer. The owner came out of a back room, glanced through the front window at my glossy foreign hybrid, and nodded to me. He seemed friendly enough, although my vehicle must have told him that I was from the city. "Nice car," he said, without the resentment I half expected. Many rural people, with some justification, considered city dwellers to be the cause of half their problems.

"I'm still getting used to it," I told him. "I didn't need a car overseas. I've been out of Canada for a long time."

"Changed, hasn't it?" he observed in a wry voice. "Not for the better, either."

"I do remember," I said carefully, "that this town used to be more...well, prosperous."

"It's partly the drought that killed us," he said. "Not to mention the price of fuel's still through the roof, and there are all these laws about how you can use your land. The smelter closed four years back — they couldn't make a dime after China and India got mad at us and stopped buying. Most of the folk around here lost their jobs or their farms, or both. They've all gone south to find work. The town'll be gone in a few years, too. Dried up and blown away like the crops."

In Latin America I had seen where people washed up when that happened: in the barrios that stitched the hems of the cities, with children picking though refuse in the shadows of the glass towers. Toronto had a barrio now. So did Montréal and Vancouver, Calgary and Halifax.

"Things may get better," I told him. "Usually they do, after a while." I regretted the words as soon as they were out of my mouth; it was a truly foolish thing to say in that place.

To his credit, he didn't glower at me. "Maybe," he answered, without conviction. "I'll believe it when I see it."

By this time I was too dispirited to eat, so I bought a cup of coffee and drove back to the city. So much had changed between December 2008 and this parched June of 2026. The future we should have done our utmost to avoid was upon us.

How did we come to this?

How to respond

to environmental demands in a divided world?

Early alarms

Had we looked, we could have seen the warning signs even before the descent began. But perpetual upheavals in Iraq, the collapse of NATO's efforts in Afghanistan and the declining stability of the Middle East all conspired to obscure the dangers ahead. Extremists and terrorists, inspired by their apparent victories, emerged from the war zones to attack innocents around the globe, and an increasingly wary world backed away from the dream of free and open borders. We Canadians were no exception and a mood of **isolationism** took hold of many of us. It was as if we hoped that by turning inward, we could escape whatever calamities might befall the rest of the world.

Meanwhile, international conferences on improving the global environment came and went, but never accomplished much. In developed countries, environmental activists and their opponents bickered year after year, mirroring the world's deep divide about humanity's role in climate change and in the decay of the environment. Even the objectivity of science became suspect as partisans of one faction or another manipulated research to their own ends.

The outbreak of SARS-2, a SARS variant transported from Asia to North America, came as a terrible jolt. North American health authorities managed to contain it after two years of struggle, but the disease and its continent-wide death toll of 11,000 left the public in shock. It was worse elsewhere: in Southeast Asia, the disease killed hundreds of thousands before it could be controlled. Nor were humans the only victims of such virulent plagues. A new avian flu burned though fowl populations from China to India, destroying local meat industries and leaving millions of people hungry, impoverished and **desperate.**

Such ecological disasters snatched public attention away from the terrorist threat and focused it on our abuse of the environment and on the damage this was inflicting on our societies. Protests spread against the effluents and emissions that were poisoning our air, soil and water, and contributing to a rising tide of birth defects, cancer, and respiratory and neurological diseases. Enormous demonstrations, riots and violence became common as activists tried to change the behaviour of their societies. Global stability wobbled, financial markets fell and energy prices rose. Here at home, furious "greens" perceived the government's environmental measures as utterly inadequate and branded them a humiliating national failure. By contrast, Canadian "browns" were of the opinion that too much had already been done for the environment, and that doing more was utterly unnecessary.

Nevertheless, many of our communities were becoming acutely **sensitive** to their environments, especially where resource companies were trying to develop new operations or expand old ones. Some communities were

willing to negotiate, but most stood unyieldingly against the companies' proposals. First Nations and Métis resistance was especially bitter after studies revealed how badly their communities had been **contaminated** by earlier resource development. These groups invoked Aboriginal and treaty rights whenever they could and frequently stopped new projects in their tracks. The resource companies often made matters worse by refusing to reveal how a development might affect local ecosystems or the benefits a community might receive in return. They even refused to commit themselves to investing in a community's businesses and industries despite having received development rights.

> The corn had sprouted, but even I could tell that something was wrong with it.

Action and reaction

Federal, provincial and municipal governments had to respond. Ottawa, however, tended to leave the field to the provinces, which had the thankless task of reconciling the conflicting demands of industry, workers, employers, activists, Aboriginal communities and the general public. Progress was slow and our resource companies did little to help the provinces avoid hasty, ill-considered responses to very difficult problems. Sadly, we did not try hard enough to work out a Canada-wide system of environmental standards, and the result was a maddening **labyrinth of regulations** and rules. Added to that, regionalism and factionalism frustrated all attempts to create a unified, green Canadian brand that would help our industries — and especially our resource industries — establish a positive image for the country abroad.

As politicians and bureaucrats debated policies and standards, environmentalists and non-government organizations (NGOs) abandoned their hopes of government leadership and developed their own **green certifications**, some of which were founded on less-than-adequate science or were covertly funded by the very industries the NGOs were targeting. Marketing firms linked industries and products to environmental slogans that were often meaningless, but attracted customers. Within a few years, most of us were buying or rejecting goods based on a manufacturer's environmental reputation, deserved or not.

Looming over everything, both at home and abroad, was the spectre of **climate change**. Its effects on lives, livelihoods and ecosystems were becoming more and more evident, and public opinion was shifting rapidly in favour of slowing greenhouse gas

emissions. But the developed nations could not even agree on domestic environmental standards, much less on international ones, and the high-growth developing economies, which hoped to achieve a decent standard of living for the first time in their histories, refused to adopt the stringent regulations proposed by some of the rich countries.

Many of us foresaw the consequences of this conflict, but we seemed powerless to avoid them. Between 2012 and 2015, the effort to find a global consensus on basic environmental standards died a lingering death, and the world's nations turned their backs on each other and went their **separate ways**. Some nations had managed to reduce their carbon footprints a little during these years, but the large emissions from the high-growth economies swamped these meagre gains.

Gains and losses

In the period that followed, environmental ethics, or the lack of them, became the defining characteristic of communities everywhere. There was little sympathy or respect for countries that managed their environment poorly or exploited it heedlessly, and questions of **human health and safety** came to dominate international relations. Younger people with affluent backgrounds and the Internet at their fingertips accused governments, business and industry of doing too little, too late. Their critics retorted that the cost of environmental protection was impoverishing individuals, businesses and entire societies. In developing nations, anger rose against foreign corporations operating to the detriment of local communities, and the challenges to these companies became more frequent and more violent.

Ignoring the rumbles in the background, affluent countries such as Canada finally began establishing their own, made-at-home systems of strict **environmental standards**. These standards varied from nation to nation but were vigorously enforced. In many poorer countries, however, standards were lax or rarely applied as governments tried to meet the economic expectations of their people. Together with low costs and growing markets, these nations could offer resource processors, as well as many other kinds of industry, an understanding attitude toward environmental regulations. Many companies could not resist the opportunity and began moving their operations to these business friendly, if environmentally suspect, nations.

Canada and other wealthy countries looked around and realized that some of their most important companies were vacating the premises. This produced unlikely alliances of industries, environmental activists and social justice organizations, which began demanding better protection from foreign competitors so corporations could afford to stay at home. Before long, trading blocs began to coalesce all over the world as countries sought out **reliable allies** to help them protect their economies from

foreign competition. Each of these blocs quickly developed its own environmental standards to reflect the bloc's general interests and those of its dominant partners.

Tariff walls promptly shot up to **levy duties** against products that failed to meet bloc standards. Inter-bloc trade began to weaken and the export industries of trading nations like Canada were soon shedding jobs. Propaganda and marketing wars broke out as blocs were labelled brown or green according to the way in which their environmental behaviour was perceived. Countries and companies that acquired a brown label could be sure of losing market share, while a green reputation, deserved or not, almost assured success.

Meanwhile, deteriorating food and water quality, ecological disasters and the threat of global pandemic created widespread fear and **uncertainty**. In 2013 and 2014, two vast crop failures in sub-Saharan Africa led to famines that killed millions. In some regions, eight out of 10 people died and smaller countries all but disappeared from the map. In Asia, a major dam breached by a rain-swollen river loosed a deluge on a sleeping countryside. Officials refused to divulge casualty figures, but foreign estimates ran as high as two million.

In Canada, many people considered resource extraction and processing to be dirty, **polluting industries** that menaced both health and the environment, and believed that the risks of development far outweighed the potential benefits. Pro-development communities disagreed with them, and these conflicts added to the growing strains within Canadian society.

By now, Canada had acquired a brown stigma because of our perceived record of environmental neglect. This reputation and the high costs of domestic resource processing caused our customers, both foreign and domestic, to start looking elsewhere. Our exports to China, India and other high-growth countries slipped further because of **limited foreign exchange** and proliferating trade barriers. The declining sales forced Canadian companies to look for every possible way to reduce costs — often at the expense of updating plants and equipment, which in turn made us less competitive and turned us even browner in the eyes of the world.

Not quite all the news was bad. New product niches at first stimulated the development of specialized technologies, while **open-source knowledge** spread rapidly via the Internet. But protecting intellectual property rights was becoming extremely difficult, and companies responded by jealously guarding every scrap of proprietary knowledge. These barriers restricted the flow of information and technology among the trading blocs, and prevented many highly skilled workers from immigrating to Canada. Belated attempts to replace them with domestically-trained employees could not make up the shortfall.

How to respond to environmental demands in a divided world?

Between 2015 and 2020, erratic swings in demand made commodity prices nearly impossible to predict. Capital investments became highly risky for our resource processing industries and many companies were unwilling to make them. The world's markets were less efficient and **protectionism** was the order of the day.

Discord and disaster

By 2020, the divide between the green and brown trading blocs and countries had become a gulf. The greens' trade barriers rewarded clean domestic industries while penalizing "dirty" imports such as oil, aluminum and steel produced in brown countries. The latter counterattacked with barriers of their own, blurring the lines between environmental protectionism, economic protectionism, self-sufficiency and national security. North America's economy wavered between **stagnation** and barely visible growth.

An obsession with economic self-sufficiency and resource control were at the heart of the downward spiral. World trade diminished in spite of demand from high-growth countries. Nations with richly endowed resource industries outlawed foreign takeovers, and global value chains began to fall apart. Countries tried to set up more bilateral trade relationships, but these barely slowed the advance of protectionism. The world was fragmenting into a collection of **distrustful** and opportunistic garrison states, with the U.S. and Canada looking more and more like a brooding Fortress North America.

Many Canadian high technology sectors — such as aerospace, which had never been able to survive on domestic demand — shrank into near-invisibility. Hundreds of thousands of us lost our jobs as **international markets evaporated** and exporters chopped their labour forces or went bankrupt. Some of the displaced found work in domestic industries that had sprung up to manufacture substitutes for formerly imported goods, but most remained unemployed, and money to retrain them was impossible to find. Many of our smaller cities and towns shrivelled as their local industries collapsed or moved away, leaving a husk of abandoned businesses, decaying homes and hungry, hopeless people.

Outside Canada, more innovative countries accepted high financial and technological risks in order to find new ways of becoming

self-sufficient. They pursued green technologies such as desalination plants, clean coal, carbon capture and storage, nuclear power and waterless industrial processing. On the alternative energy front, some looked to biotechnology, photovoltaics, wind and hydrogen for substitutes for oil and coal, while others pursued sources such as deep-well geothermal power, ocean thermal-energy conversion and gas hydrates mined from the sea floor. **Nanotechnologies** promised new, "smart" materials and processes that would shrink the consumption of natural resources and reduce pollution, help remove contaminants from soil, air and water, and increase agricultural yields.

> "It's partly the drought that killed us," he said. "Not to mention the price of fuel's still through the roof, and there are all these laws about how you can use your land.

For nations with rich natural resources, these technologies held out the hope of a better environment, more competitive resource industries and new products and technologies we could sell at home and abroad. But although the rate of technology adoption soared in some places, the results were too often hit-or-miss because the technology was usually developed in **erratic** and disorganized ways.

In Canada, to our great loss, we failed to seize that fleeting moment of promise. As it passed, a growing class of have-nots watched the fortunate few with envy and resentment, and social tensions rose sharply. The searing North American drought of 2021, and the disastrous wheat harvests that followed, drove the price of bread to nine dollars a loaf. **Hunger riots broke** out from St John's to Victoria, and an anti-poverty protest on Parliament Hill turned into a two-day insurrection that left 60 people dead, 221 injured and a dozen burned-out buildings along Rideau and Wellington Streets. Parliament's Centre Block and the Peace Tower came within a hair's breadth of being set afire.

Stagnation and decline

Canadian resource processors continued to **overexploit** low-quality, high-cost materials while using technologies considered obsolescent and brown. This only added to their expenses and drove more customers away. Some tried to consolidate, hoping for lower costs and higher efficiency, but the payoffs were meagre. And they were

still considered brown, which by the early 2020s was a major business disadvantage both domestically and internationally.

They did their best to turn that perception around, but they found the international green markets very difficult to satisfy. Numerous companies, including several multinationals, could no longer afford to meet the environmental standards of stringently green blocs such as the EU, and turned entirely to the brown markets. Others tried to keep a foot in each camp by selling to green markets when they could, and to brown markets when they had to. But no matter what they did, it was clear that our resource processors would **continue losing customers** as the developed blocs raised yet more trade barriers. Even the United States and Mexico, our closest trade allies, had begun to look askance at the environmental costs of Canadian oil, gas, minerals and refinery products.

By the early 2020s, most Canadians had gloomily realized that we would never now become a world supplier of green consumer goods and green technologies. We had failed because of a small domestic economy that could not, by itself, sustain our high-technology industries; because of our over-dependence on the constricted markets of Fortress North America; because of the trade barriers that kept us out of rapidly growing, **transitional economies**; and above all, because of our inability to develop and commercialize green technologies as quickly as our competitors. Ill-prepared for the division of the world into green and brown, and for the opportunities this offered, we had let our chances slip away.

Our future now looks bleak, and it is little consolation that we are not alone. The world has become an archipelago of garrison states, isolated and obsessed with self-protection. Our future will be measured in a **decaying environment**, unsupportable demands on vital resources, deteriorating human health and the deepening effects of climate change. But no one seems willing to pay the costs of restoring global stability and economic wellbeing, or of choosing to mend the tattered fabric of the world's societies.

That exhausted little town I visited, with its boarded windows, the grass growing in the broken asphalt of its streets and the failing store with its half-empty shelves and its weary, resigned owner, stands as a microcosm of what we have become. Perhaps, as I said to him, things will someday, somehow, get better. But I, too, will believe it when I see it.

2

DOUBLE-EDGED **SWORD**

STRONG
Global Dynamics and Geopolitical Relationships

COMPLIANT
Society's Perspective on the Environment

Scenario 2

Dysfunctional environmental policies stifle technology development and undermine Canada's competitiveness

DOUBLE-EDGED **SWORD**

Not long before the crises began, my spouse and I renewed our debate about emigrating to Scandinavia. He had relatives in Sweden and felt that if anybody could remain civilized while weathering the coming storms, it would be the Scandinavians.

That conversation is now almost two decades behind us, but it remains vivid in my memory: I the academic, he the scientist, strolling across Parliament Hill in the warm May sunshine. We'd just left the House of Commons where the politicians were debating the new environmental legislation; the Tulip Festival had begun and Parliament Hill was garlanded with masses of crimson and gold. Because of the ever-earlier onset of spring, that was the last time the Festival was held in May. The next year they had to hold the festivities in April.

"I'm still not so sure that emigrating is a good idea," I told him. "Anyway, Canada's always tried to be pretty civilized. And you and I were born and raised here. Could we actually leave?"

"You heard what they were proposing in the House," he said. "They

haven't thought the legislation through and it's not going to work the way they think it is. They've finally accepted that we're in serious trouble with the environment, but this is just another quick fix to keep people from getting more worried than they already are. It's going to create more mess than it cleans up. I'm not sure I want to be here when that happens."

"They're just trying to make Canada greener and cleaner," I observed, trying to be optimistic in spite of all I'd written and learned about human history. "And maybe it will work."

"And if it doesn't?"

"How should I know?" I answered. "You're the environmental expert. You tell me."

"I wish I could," he said. "They're taking us into uncharted waters. I think we're going to see some really brutal examples of the law of unintended consequences. Maybe you can write a paper about it someday."

In the end, we didn't go to Scandinavia. Now, in the summer of 2026, we're still in Canada and I'm finally writing the paper he talked about. Canada is still here too, but it's not the country of that long-ago spring, when they were still holding the Tulip Festival in May.

Would we have stayed if we'd foreseen what lay ahead of us? I still don't know, but I do know how the disasters started: with the weather.

How to balance

short and long term interests on environmental issues?

Weather warnings

We Canadians are used to seasonal extremes, but by 2010 even the most blasé among us had realized that the climate was becoming more violent. Every winter, week-long blizzards **paralyzed** major cities in the east, while summer droughts shrank the water supplies of Prairie towns to dangerous levels. Ice storms left whole regions freezing and dark for weeks, and spring thaws brought torrential floods that swamped communities from British Columbia to Newfoundland.

Confronted by such disasters, we finally began to understand that the ecological systems keeping us alive were not indestructible, and that our activities could make the environment downright dangerous. New studies revealed that there were more toxins in our food and drinking water than ever before and, as if to emphasize the point, a chemical spill in central Canada killed 90 people and sickened hundreds. But this was nothing to the summer in which a huge industrial fire, combined with a record heat wave, created lethal smog in Ontario that caused more than 2000 deaths and overwhelmed hospitals with gasping patients.

Outraged, we issued a warning to our leaders: We demand limits to the exploitation of our water, land and air. Your political fate hangs on your environmental policies and your environmental record. We demand **accountability** from our governments and our industries, and you will both pay a price if you do not provide it.

Public anger and the social-networking power of the Internet combined to create a powerful force for global change. NGOs and citizens' groups popped up all over the developed world and found inspiration in the strategies that the labour unions had perfected 80 years before. Whole communities organized and voted en masse for environmentally conscious political candidates; special-interest groups, whose members were geographically scattered but electronically united, also voted as blocs. Politicians, sensing the direction of the wind, not only promised action but finally began to deliver it.

Shifts in the wind

Canadians wanted to safeguard their environment, but in our naïveté we were quite unprepared for the wrenching economic and social changes that would result. The problems were real and needed solutions but, as any historian will tell you, people and their leaders frequently leap before they look. That basic error in judgment, and the dysfunctional policies, laws, regulations and standards to which it led, created a **momentum** that would shape the course of the next decade and a half. Repeated around the world, the same mistake demolished a myriad of hopes and good intentions, and created one disaster after another.

Here in Canada, the country's resource processing industries were a special target for the environmentally concerned. Heading the list of offenders was

the oil sands industry, which was seen as having prodigal greenhouse gas emissions, an insatiable thirst for water and dire effects on the regional environment. Unfortunately, many of us overlooked the fact that the oil sands, like most other Canadian resource industries, filled a vital economic role not only at home but also abroad. Still, the most visible characteristics of these industries were their **enormous profits** and the perception that they caused equally enormous environmental damage.

Canadians decided that some of this wealth should be returned to them as cleaner air, soil and water, and as better protection for the biosphere. There was relentless pressure for legislation that would supposedly achieve this, and legislation was delivered. It set hard targets for controlling CO2 emissions, water consumption, air and water quality, and, as time went on, for managing many other environmental problems. The new laws attracted much bitter opposition, but the measure that raised the most **uproar** was a new system of environmental taxes.

The motives for these taxes were laudable, because they required Canadian industries to account for the environmental costs of their products — that is, the costs that their manufacturing activities imposed on ecological systems and on human health and society. But environmental costing added a great deal to the expense and complexity of doing business, and while it put our standards far ahead of those of most other countries, these same standards choked off imports from places that did not manage their **environmental costs** to Canadian standards.

The legislation, it must be said, was not completely draconian. For companies struggling with tighter regulations and higher costs, governments provided temporary subsidies from the new tax revenues so businesses could buy cleaner, more efficient technologies — usually from abroad, since Canadian development in this sector was lagging. And, in a decision whose unintended results were to haunt us for years, the rest of the tax money was invested in funding for environmental R&D, especially in technologies that would produce the most results in the shortest possible time.

The cash did at first create a vigorous surge of research, development and commercialization and, for an all-too-brief moment, it appeared that we were doing exactly the right thing. But the surge was **unsustainable** and short-lived. The flood of new tax money drove out private investment rather than augmenting it, and researchers were pushed into concentrating on late-stage technologies that could be used sooner rather than later — and in the rush to find **quick, easy fixes**, they as often as not bet on the wrong approaches.

Even worse, in retrospect, was that the pressure to find answers distracted us from the fundamental research that could have led to the discovery of radically new ways

of doing things. Paradoxically, the extra money, which was supposed to finance solutions to so many environmental problems, instead **stifled new ideas**, slowed the pace of commercialization and eliminated most prospects of creating advanced products we could both export and use at home. In stark contrast, innovators in other countries were busily developing the latest in equipment, processes and applications that would put them even farther ahead of us.

At the same time, many Canadians itched to punish industry for its transgressions, real or perceived, and companies that were trying hard to reduce their **environmental impact** were tarred with the same brush as the most irresponsible polluters. Public opinion demanded ever more stringent environmental policies and regulations, even when further reflection might have revealed these measures to be either useless or dangerously counterproductive. Activist groups, for example, focused on the land itself and pushed legislation that would protect pristine wilderness, or restore regions already degraded by development. This legislation was laudable in principle, but it put many areas off-limits to our resource industries, and made resource extraction more difficult and expensive even in places where they were allowed to operate. Moreover, the new laws were often hastily drafted and put in place without regard for their **economic consequences**. This drove Canadian processing costs up in spite of everything the companies could do to prevent it. Our exports diminished and soon our entire resource processing sector, from aluminum to steel, was shrinking at an unnerving pace.

But despite the economic costs of such reckless policies, the public commitment to a greener Canada did not waver. As consumers, we refused to buy goods that appeared to be bad for the environment, and looked instead for better-behaved substitutes. But many common products became more expensive as environmental costing took hold, and inflation began to pick up in tandem with these rising costs. Workers, reasonably enough, started asking for pay increases, which threatened to trigger a dangerous wage-price spiral.

Crumbling foundations

By the middle of the century's second decade, the results of our short-sighted zeal were becoming obvious. Businesses sagged under increasing regulation, domestic economic growth stagnated and inflation jumped. Profits plummeted and thousands of businesses slashed jobs in their struggle to stay afloat. Throngs of newly unemployed looked to governments for retraining and social assistance, but tax revenues were so low that there was little money to help them. Immigration slowed to a trickle and the **population shrank** for the first time since Confederation. Public and private capital for research and development were also vanishing. All we could rely on now was a

much-reduced volume of raw material exports — an expedient whose time was rapidly running out.

Beyond our borders, other countries were repeating a now-familiar pattern: public outrage at the state of the environment led to the organization of citizens' groups via the social-networking tools of the Internet, which in turn created **relentless pressures** for immediate action. Few governments dared resist, even when there was good evidence that the policies being urged upon them would cause more problems than they solved. But objective voices had little chance of being heard above the clamour, and expediency ruled the day.

> They've finally accepted that we're in serious trouble with the environment, but this is just another quick fix to keep people from getting more worried than they already are.

A common policy, which many governments seized upon as an easy solution, was to require companies to adopt full environmental costing for their products. One unintended consequence of this was to make exports more expensive, because longer journeys to market consumed more fossil fuel and **created more emissions**. Soon, foreign consumers and businesses that had once bought Canada's products began turning more and more to locally produced goods. This was an ominous development, but most of us were too preoccupied with our own economic troubles to worry about it.

Had we done so, we would have seen that global trade and growth were about to shrink for the first time in decades, and that the future looked especially dark for Canada's resource industries. Most were already struggling with **diminished markets**, ever-rising compliance costs and an unprecedented shift in the investment, policy and political climates. And yet more regulations, such as those spawned by product life cycle profiling, loomed on the horizon.

Parts of the Canadian economy managed a faltering recovery beginning in 2017, based on industries that exploited niche markets by finding ways to add value to their traditional products. But few of our resource processors were able to do this, barring some exceptionally nimble companies that seized on the value-added strategy and discovered ways to turn a small profit. Still, proponents of the environmental cause could point to some **successes**: air quality was better in the cities, fish catches in the Great Lakes were up and CO2 emissions were down. Some

Canadians felt that, on balance, the situation was positive — a view rarely shared by those of us who were out of work or had lost our businesses.

Some investments in green R&D were beginning to pay off, although most of the technology developed during the research surge was expensive and inadequately tested. A major problem too was its **incompatibility** with much of the equipment our manufacturers were now using; unable to wait for Canadian R&D to give them what they needed, our businesses had purchased their environmental technologies from more advanced suppliers abroad. Faced with a meagre domestic market and stiff foreign competition, most Canadian companies in this sector were barely hanging on.

Emissions and climate change were still a major bone of contention around the world, and governments persisted in trying to find an international consensus to help control the threat. But the countries that were most vigorous in curbing emissions complained that they were doing more than their fair share, and declared that the laggards must do better than merely catch up. The "**laggards**," usually nations with developing economies, retorted that they were economically still far behind the wealthy countries, and that they should be allowed considerable leeway as a result.

The **recurring stalemate** made a wide-ranging global agreement on climate change impossible. But it was equally impossible for governments to appear to do nothing, so during the next few years they erected a ramshackle structure of international, but relatively narrow, environmental accords. Many of the resulting policies were more or less dictated by worldwide interest groups that were based on Internet-based social networks; these drew for inspiration on the huge volume of climate information that flowed through the Internet, but often did not distinguish between good data and bad. The resulting policies were all too often unexamined, superficial, ineffective and driven by mob psychology. Many were decidedly reckless. For astute observers, it was a perfect example of a well-intentioned, broad-based social movement that had gone terribly wrong.

Policy disputes were not limited to the world stage, nor were bad decisions. Even within greener nations, local jurisdictions squabbled over standards and some regions went so far as to restrict the "import" of products manufactured elsewhere in the same country. We Canadians were especially prone to such behaviour, and provinces whose economies relied on resource extraction and processing bickered constantly with the provinces that preferred the benefits of greener businesses and a cleaner environment. Acrimony on both sides made reasoned, careful decisions much harder to reach and encouraged the introduction of yet more dysfunctional policies.

Winners and losers

Even during the fragile recovery of 2017, Canada's resource processors continued to suffer from the legislative, environmental and economic shocks of the previous years. Easy access to resources was no longer enough to sustain these corporations. They not only had to use increasingly expensive inputs in environmentally responsible ways, but also had to find value-added approaches to make their wares more competitive.

In an ideal world, they could have done this by speedily adopting advanced technologies that would support **clean, efficient and profitable** production. But in the real world, it was precisely these technologies that were in short supply. Even if they had been readily available, it was often nearly impossible to make money while complying with a myriad of **ineptly designed** environmental laws, regulations, rules, standards and directives that varied from not merely from province to province but even from municipality to municipality — and often contradicted each other even within the same jurisdiction.

It says much for Canadian business that, by the end of the decade, some companies had managed to stumble though the labyrinth, install the technologies they needed and begin to turn a meagre profit. But they nevertheless remained on the razor's edge of failure and were far **outnumbered** by the companies that were losing ground. Capital to support innovation remained scarce, and research and development languished. Skilled labour was also in short supply, a result of the years in which companies had slashed jobs and invested almost nothing in employee training.

Steadily shrinking tax revenues, moreover, reduced our governments' freedom of action even as they struggled to balance too many **conflicting needs** — the demand for new, green infrastructure; the need to fund wider post-secondary education; the need to retrain and relocate people thrown out of work by collapsing companies; and the urgency of fighting the perception that Canada's resource processing industries were terminally ill. But the mass of bad policy that had become embedded in our social and industrial landscapes during the previous years could not be repudiated without public outcry and frustrated most efforts at improvement.

Several of our resource processors nevertheless decided to resist their apparently inevitable demise. They abandoned their approach of doing just enough to maintain a green image and began to bring green principles into all their decisions. Instead of looking for ways to clean up the environment after polluting it, they designed facilities to keep the pollution from occurring in the first place. Truly enterprising companies stopped seeing waste as an annoyance that cost them money to get rid of, and began to view it as raw material for new products.

How to balance
short and long term interests on environmental issues?

By 2020, a few companies were finding **ways to benefit**, although in very small ways, from the new, closely regulated business environment.

Hard times

The world's public had expected much of the environmental laws they had so passionately demanded, and which their governments had struggled to deliver in spite of the probable consequences. But by 2021, it was increasingly clear that this stupendous effort had cost much and, on balance, delivered little. Air and water were cleaner in some places but unemployment was rife; alternative energies were expanding, but came with unexpected economic and environmental costs; emissions intensity was falling but many economies were slowing down. Public outrage surged again as economic and social conditions deteriorated, and accusations of bad faith, incompetence and conspiracy flew at the heads of business and government leaders alike. Before long, the popular view was that the first wave of environmental laws had been too feeble to control the destruction of the environment and ensure the public good, so it was clearly time for **harsher measures**.

This view carried the day. National governments quickly adopted even more stringent environmental policies, which were as poorly thought out as the earlier ones had been. Worse, these policies became embedded in international agreements that provided for trade sanctions against nations whose products or industries were deemed to be environmentally irresponsible. Sanctions soon proliferated as a result, causing economic shocks to ripple around the world as country after country erected environmentally-based trade barriers against "dirty" goods from other nations.

The results could hardly have been more dire for Canadians. Trying to shake off accusations that our reputedly dirty resource industries made us **environmental evildoers**, governments across the country forced resource processors to obey zero-effluent and zero-emission regulations. Water and carbon credits became extremely expensive, which sounded a death knell for many companies that had hoped to become green but were abruptly pigeonholed as dirty. Plants closed and more men and women lost their livelihoods.

Multinational resource companies operating in Canada were badly hurt by this new environmental regime,

since their exports were suddenly restricted to trading partners with regulations comparable to ours. Some of the multinationals considered adapting to Canada's zero-based emissions standards, but most decided they had **too little time** to bring new technologies online, retrain their current employees and find new personnel with more up-to-date skills. Instead, they cut back on their Canadian processing operations, or dropped processing in favour of straightforward extraction, or simply uprooted themselves and moved to locations with less stringent standards. A scattering of smaller, greener Canadian producers replaced them, but these could not absorb all the people thrown out of work by the multinationals' departure.

> "They're just trying to make Canada greener and cleaner," I observed, trying to be optimistic in spite of all I'd written and learned about human history.

The way we live now

Looking back from 2026, it is clear that we should have been far more careful about the environmental policies we adopted. We too often demanded easy solutions to very complex problems, and the consequences of choosing badly have been more far-reaching and dire than the vast majority of us ever expected.

But even given our too-hasty decisions, Canada could have avoided some of the worst results if we had worked harder to develop new technologies that could **add value** to our established products or, better yet, create new ones. A handful of our larger firms are recovering partly because they did this, and partly because they also bought internationally available green technologies to make their products environmentally acceptable to world markets. But most surviving Canadian resource companies, especially the smaller ones, remain far too weak to follow their example. The remainder have **vanished** into bankruptcy or have been snapped up by foreign corporations looking for easy access to our resources.

For now, though, Canadians still seem to accept the trade-offs that **protect their environment**. Our air and water are perceptibly cleaner and our industries cause less ecological damage than before. The country's environmental standards are among the toughest on the planet, while public support for them remains very strong despite the costs they have imposed. Environmental responsibility and sustainable

development are now a part of our daily life; dozens of cities have banned motor vehicles from their downtown cores, which has made telecommuting increasingly popular for both employers and employees. Governments continue to **invest** in green infrastructure, such as the long-awaited, high-speed rail link from Montréal to Toronto. Unfortunately, because of much-reduced tax revenues, these investments have tended to be patchy and ineffective.

Yet the "green wave," which once seemed to promise so much, has turned out to be a **double-edged sword**. Because of it, we are no longer one of the world's industrial leaders. We are forced to buy advanced environmental technology from other nations and are reduced to exporting meagre quantities of our natural resources where and when we can afford it. Once we were a nation of international traders, but now we see our **exports decline** every year and our businesses no longer look abroad.

At the human level, myriads of Canadians are unemployed and most of us who still work are far poorer than we were two decades ago. The economy is stagnant and the cost of living rises while our standard of living falls. The tensions between the rich and the poor have never been sharper, and there has been riot and bloodshed in front of the Peace Tower itself. No longer can my spouse and I stroll across Parliament Hill as we once did, for it is now **gated and guarded**, and you need a pass to enter. The tulips still bloom there every spring, but no one comes to see them anymore.

3

SURVIVAL of the **FITTEST**

WEAK
Global Dynamics and Geopolitical Relationships

INTEGRAL
Society's Perspective on the Environment

Scenario 3

The global resource boom suddenly ends and transformative technologies force Canadian resource processors to adapt or perish

SURVIVAL of the **FITTEST**

I sit at my study window and gaze across the city, down to the harbour where freighters' lights wink in the gathering dusk. The afternoon's storm has departed and a heavy-lift airship is aloft, its silver flanks dusted with tangerine by the fading light. Afloat above the city, it resembles an exotic fish drifting across a coral reef.

That is perhaps a too-neat metaphor for the way we live now, but it is true nonetheless — like the denizens of the reef, we too inhabit a world where the fit survive and the unfit do not. Our societies and industries are under relentless pressure to adapt, our technologies change almost overnight and the only way to survive is to invest in human capital and new knowledge.

For many years before I took up a historian's vocation, I worked for Canadian companies that extracted wealth from the earth. Between 2008 and 2025, I saw them prosper for a time, then struggle for their existence in a bitterly competitive world that demanded new ideas, new forms of business,

new kinds of international trade and new, greener ways of making things. Many failed and when they did, the communities that depended on them were devastated.

Some survived. They did so because their leaders, like one company president I knew, not only sensed that a crisis was coming but also had the courage to invest in preparing for it. This was in character for him, since he firmly believed that one of the most dangerous times for a firm was when things were going well — the better they went for his company, in fact, the gloomier he became. So he and others like him looked at their balance sheets and their business plans, imagined the events that would most threaten their companies' survival, and tried to get ready for the bad times. If it had not been for those leaders, Canada would now be much worse off than it actually is.

Looking back from this spring of 2026, there is no doubt that we could have done far better than we did. But perhaps we can be forgiven some of our mistakes. During those years of upheaval, the future was so hard to read that any choice might have turned out to be the wrong one. Many were.

How to position

for significant changes in the natural resources marketplace?

Out of the doldrums

For many Canadians and Americans, 2008 and 2009 were very difficult. Millions of home foreclosures in the U.S. shattered not just families but whole communities, and a recession further deepened the gloom that Americans felt about their future. Here in Canada, while the west's oil and gas sector prospered, the east's manufacturing industries shrank as U.S. demand for Canadian products ebbed. The high growth of the developing economies slowed as well, and for a time it appeared that the days of feverish expansion, even in countries like India and China, were over.

But the good times did return. The global appetite for resources and commodities not only bounced back but became more **voracious**. Everything from minerals to food was grist to the mills of Brazil, Russia, India, China and the rest of the developing world; prices danced ever upward and our resource industries prospered. For a few years, it was almost impossible for well-run Canadian commodity companies not to make money, and as we piled up the profits, we put them to good use. We expanded production capacity, looked for new sources of raw materials and plunged into new business ventures.

As the global economy picked up, people who followed the world news noticed that it was becoming noticeably less dramatic, and in some weeks it was even boring. Countries were squabbling less than usual. The Middle East, against all odds, seemed less combustible, and many NATO, Canadian and U.S. troops were coming home. Oil prices remained very high, but seemed to have **stabilized**.

It was a breathing space that allowed governments to look more attentively at the state of global trade and the environment, and, having looked, they decided to make improvements. After much argument and negotiation, they surprised even themselves by agreeing not only on new rules for international trade, but also on a set of basic international environmental standards that would immediately apply to the developed nations and would also allow time for less-developed countries to comply.

The success was so unexpected that it gave the world a new sense of confidence and optimism. More concretely, the economic fallout from this new buoyancy was a **global surge** in R&D and the rapid commercialization of its results. New production techniques, new technologies and new products popped into existence from Macau to Montréal. Businesses and consumers enthusiastically applied them or bought them, and myriads of new ideas and approaches diffused rapidly throughout the world. New international standards and trade rules encouraged this intellectual and technological ferment — although in some industries, change was so rapid that traditional methods of intellectual property protection were almost **useless**.

The golden afternoon

These were **sunny days** for Canada's resource processors and the people who worked for them. The world bought all we could produce, at very comfortable prices. But success lulled many companies into a false sense of security, and their leaders remained convinced that our traditional exports, technologies and production methods, together with a modest amount of environmental innovation, would keep us prosperous for decades to come. A smaller number, fortunately, were headed by canny people who used the good times to prepare for the bad ones that would inevitably follow. These firms consistently spent substantial sums on developing new **value-added** products, on environmental R&D and on adopting new, greener technologies. This decision was to make a great deal of difference to them later on — although at the time they were often viewed as alarmists that were squandering revenue on research that would never return the investment.

The world's hunger for commodities was also a boon for resource processing industries that operated in emerging economies, where firms could sometimes benefit from relatively lax environmental regulations. This was a **transient advantage,** since the multinationals were moving to embrace the new, common standards. But not all emerging countries were winners: some remained trapped in poverty, ill health, inadequate education and environmental decay. In the worst-off places, the ruin of small farmers through drought and government neglect, together with high world food prices, drove whole populations to the brink of starvation and made their governments tremble.

> Our societies and industries are under relentless pressure to adapt, our technologies change almost overnight and the only way to survive is to invest in human capital and new knowledge.

Yet many emerging economies managed to be environmentally responsible and still do well. They had large pools of low-cost but increasingly skilled labour, and built on these advantages by adopting new technologies. Moreover, most had never created the 20th-century infrastructures that were once the pride of the wealthy nations. Free of these obsolescent and expensive legacies, they **leapfrogged** straight to new technologies, processes and materials that ranged from biodegradable plastics to carbon fibre, from nanomaterials to advanced fuel cells. At the same

time, old wastes became new resources: mine tailings could be, sometimes literally, gold mines; oil upgrading released valuable gases for capture and sale; agricultural and forestry wastes could be turned into biofuels.

As resources and production methods evolved, global value chains wriggled into increasingly complex patterns and entirely new ones appeared. Governments, or at least the forward-looking ones, began creating incentives for investment, for advanced R&D and for commercializing the products that would result. Researchers and civil servants tried to approach problems in fresh ways. Many expectations were pinned on a belief in "Schumpeterian creative destruction" and the power of technological change to help that process along.

The end of the illusion

Just before 2020, our resource processors' sunny afternoon **clouded** over. The global resource boom slowed as the demand for oil began outstripping supply, and it soon became clear that a vast gulf was opening between the world's oil needs and the amount of crude that was, or ever would be, available. As global markets absorbed this news, the price of oil shot upward at an alarming rate. This had happened before, notably in 2008, but this time it was different, for the world now knew that supply would never again equal demand. This meant that the rise in the cost of oil was not only irreversible, but had no clear upper limit.

Financial markets slid into turmoil as a result, and capital grew scarce and expensive. Political alliances came under scrutiny as it became obvious that while the oil-producing nations would remain important in the short term, their positions would **inevitably weaken** as their shrinking supplies forced them to cut production. Some countries, in fact, reluctantly admitted that they were already close to exhausting their reserves.

The previously collaborative approach of the world's governments broke down as the pressure to shift to emerging technologies and new value chains became overwhelming. Political relationships turned fractious as resources became scarcer and more expensive to extract and transport, and as the levels of commodity production were found to be **unsustainable**. One of the chief consequences of this squabbling was the collapse of the international system of knowledge transfer, upon which many nations had relied for the commercialization and development of new technologies.

Some nations had already invested in these new technologies and ways of doing business, and were better prepared than others to weather this new storm. Canada, unfortunately, was not among them. Our **obsolescent** enabling technologies, including those that supported our resource processing industries, could not produce the

leaps in performance and technology that the country now needed to stay competitive. This was extremely hard for Canadians to admit, especially since we had always considered ourselves to be a highly advanced, technologically sophisticated, first-world country. That we might actually be second-rate, even in comparison to some developing nations, was very unwelcome news. As a result, most of us initially denied what was staring us in the face.

Denial did not change the unpleasant truths that dictated our lack of competitiveness. Far too much of our industrial infrastructure was designed for an era when commodities were easy to come by, **inefficiencies** could be tolerated and investment in new technologies was of marginal importance. We had succeeded for a long time on the world market because of our readily accessible resources, but as those became scarce, we had lost our cost advantages and our foreign competitors were now closing in on us. Our **failure to invest** in value-added processes and products was also coming back to haunt us; worse yet, many overseas companies had done what we had not, and were using advanced technologies to profit from hard-to-exploit resources. This was something we were quite unable to do, and our markets shrivelled. We had to adapt or perish.

This was an imperative that demanded a quick and effective response, but our denial of our shortcomings blinded us to the perils of delay and the need for **decisive action**. Instead, our industries asked for and received government subsidies that they used to support their old ways of doing things, which merely put off the day of reckoning. We blamed other countries for "dumping" and "unfair trading" when we should have been trying to understand the reasons for their success. And we **avoided hard decisions** in the hope that some unspecified good fortune would befall us, or that the world might magically return to the way it used to be.

Ultimately, however, we came to the painful realization that most of the fault was not in others, but in ourselves. A multitude of Canadian companies finally began a floundering attempt to adjust, but many were now suffering from low share values and poor capitalization and found the struggle an uphill one. Even then there were truly short-sighted managers who believed that the boom would return and refused to invest in new technologies or in the worker training needed to take advantage of them. Firms controlled by such people rapidly collapsed or were gobbled up by larger companies.

The crisis in the resource processing industry struck Canada's economy like a **sledgehammer**. Mills and factories fell permanently silent or shut down for months in a desperate race to re-tool and rebuild before time ran out. The collapse devastated businesses that depended on mines, refineries and foundries for their livelihood, and in

How to position for significant changes in the natural resources marketplace?

the worst-hit communities, unemployment reached numbers unknown since the Great Depression. It was not only the resource processors that were in trouble, either. In every sector of the economy, company executives scrutinized their balance sheets with worried eyes, wondering if their industry would be the next to collapse under the weight of foreign competition, lack of capital, rising costs and obsolescent technology.

Fortunately, Canada possessed a number of corporations that managed to **reinvent** themselves and survive. In the resource processing sector, the most robust of these were the companies that had invested in new technology and environmental R&D. But the others tottered and most of them fell; in Canada's economy as in others, "survival of the fittest" was no longer a glib catchphrase but a **painful reality**.

Surviving the fall

By 2020, men and women gathered in the boardrooms of Canada's corporations to wrestle with some very difficult questions. Where would they find the capital to modernize their country's factories and infrastructure? What business strategies would restore their fortunes? How could they make their products more valuable? On what technologies should they pin their hopes of survival?

Some industries chose to **exploit** new resources. The global energy sector, for example, looked for answers in geothermal, solar, tidal and wind power technologies, and sought new forms of storage to underpin them. Research institutions on six continents focused on biotechnology and nanotechnology, disciplines that were advancing quickly and beginning to overlap. Scientists in the European Union created novel ways of tracking energy transfers and expenditures, which in turn stimulated new ways of monitoring carbon footprints and environmental costs.

Breakthroughs in nanotechnology became more and more significant and put increasing pressure on the world's industries to take advantage of them. There was no real alternative to doing so, since it was plain that nanotechnology could lead to new, highly efficient materials and processes that would revolutionize our way of doing things. The list of **futuristic** products and processes seemed endless: new drugs and surgical tools; smart unmanned vehicles for war and peace; miniature,

high-capacity power supplies; intelligent transportation systems and advanced automotive devices; alternative energy systems; more efficient lighting and improved power distribution; processes to decontaminate soil, air and water; and a array of synthetic materials that could be produced with fewer natural resources and **less pollution**.

Combined with biotechnology and information technology, **nanoscience** also promised the advent of smart sensors that would revolutionize process controls and make low-carbon economies possible. Perhaps the most exotic research of all was in nanofactory applications, which were based on the ability of nanotechnology to duplicate its own means of production. In other words, nanofactories could not only build things, but also build more factories exactly like themselves.

These breakthroughs were not good news for some of Canada's industries. Because nanotechnology and biotechnology could create viable **substitutes** for many older goods and processes, they were a serious threat to Canadian companies that persisted in using or producing traditional materials, even if they had adopted the latest, **greenest** and most efficient technologies. The threat, ironically, affected many firms that had recently reinvented themselves and were beginning to struggle back to **prosperity**. Now, facing a future in which nanotechnology and biotechnology would bring new competition from every quarter, they had to do it all over again. Moreover, it was plain that countries with next to no raw materials could use these technologies to compete with Canadian resource producers and processors, and this realization sent waves of **alarm** through corporate investment planners across the country. Canada's training institutions scrambled to keep up with the frenzied pace of technological change, while successful companies tried to assist by training new employees and retraining old ones. Our openness to immigration was a source of strength because it attracted highly skilled professionals from other countries.

> Many failed and when they did, the communities that depended on them were devastated.

The road ahead

Now, in 2026, we are beginning to see the hazy outlines of our future — or of our possible futures, which will materialize according to how wisely we act. It is clear that the struggles of the past few years have paid off for some of our companies. We remain strong in extractive technologies, and our chemical and plastics sectors are creating new, value-added products that are hard

to find elsewhere. The surviving corporations of Canada's forestry industry are becoming known for their **expertise** in biomass-derived energy and in new fibre products such as nano-crystalline cellulose. Other firms are moving ahead in sophisticated disciplines such as nano-film solar energy, bioprocessing and green information and communications technologies. Many of these companies are attracting investments from abroad and are beginning to find new markets at home and around the world.

So the firms that have best **survived** the turmoil of the recent past, and are beginning to prosper again, have been those that developed their capacity to adapt. Yet our overall weakness in creating, commercializing and adopting advanced technologies remains a persistent drag on our progress, and Canada remains one of the world's losers. Moreover, the foreign companies that survived the end of the global resource boom are starting to bring their innovations to market, and new products and **processes** arrive on our shores almost daily. That fierce competition will continue to overwhelm us if we fail to adapt to the realities of this new world, and Canada will become even more of an economic backwater.

But there is reason for **hope**, and I see it in the presence of that enormous airship, gliding now into the east. Its super-efficient motors are fuelled with bioengineered ethanol, its skin is a gossamer nanotech fabric stronger than steel, its skeleton a web of almost weightless ceramic. Most of it was constructed in other countries, but not all; Canadian biotechnology filled its ethanol tanks and Canadian engineering designed and built its flight systems. Yet the airship also stands for the myriad of **opportunities** that we missed: some of the technologies embedded in it were once ours and the world's best, but years ago we sold our knowledge to other countries because we thought it was cheaper to follow than to lead. These lost chances have cost us dearly, and if we are to survive, we must never make such mistakes again.

4

ALL for **ALL**

STRONG
Global Dynamics and Geopolitical Relationships

INTEGRAL
Society's Perspective on the Environment

Scenario 4

Global famine leads to the rejection of unbridled consumerism and a profound transformation of human society

ALL for **ALL**

Not long ago, my great-granddaughter had to do a school project about the 20th century. Being a historian myself, I wanted to teach her the importance of primary sources, so we went to an antiquarian bookstore and ransacked it for an afternoon. Just before we left, we came across a stack of magazines from the early 1950s. Opening one of them, she scanned the crumbling brown pages. After a moment, she exclaimed, "Look!"

It was a brief article about the whaling industry. At the end, the author had written: Because of man's growing need for whale oil, these magnificent animals may soon become extinct. There it stopped. No more needed to be said about the whales' fate, apparently.

"Extinct?" she asked, with shock in her 12-year-old voice. "But didn't people care about killing all the whales?"

"No, we didn't," I confessed uncomfortably.

She looked down at the acid-rusted paper and said, "Why not?"

In the tram on the way home, I tried to explain why her world and the world of my own childhood were so different. I told her how people in those days thought they needed more of everything, even if this made things worse for other people. That we didn't care if we used something up, including whales, if that was the price of getting what we wanted. If the world ran out of a thing, we believed, we'd simply find another thing to replace it, and use that up too. In the meantime, if a thing broke or got older than we liked, we threw it away. This wasn't just in Canada, I added. In 2008, almost everyone in the world was heading in that direction. But now, in 2026, almost everyone wasn't. The change happened that fast.

"But that's all so silly," she pointed out. "It's dumb to want a lot of stuff you don't need. Everybody knows that. And you have to make new things out of old things, or you're wasting them. And you should try to make life better for people, not worse. Everybody knows that too."

"They do now," I agreed. The tramway was winding through an industrial area of the city; outside the window, a new clean-coal plant slid into view. Beside it was a lovingly tended community vegetable garden, established no doubt by the plant's workers.

"How come it all changed?" she asked.

I did have the answer to that. In a word: starvation.

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the resources sector in a post-consumption society?

The great hunger

The threat of famine had been present even before 2008, as swelling populations and incomes in the emerging economies drove the global demand for food and feed grains skyward. At the same time, agricultural yields in the developing nations were dropping in tandem with the rising price of fuels, which left farmers little money for seeds, fertilizer or irrigation works. By 2010, world food reserves were at their lowest levels since 1945.

That was bad enough, but climate change was driving **increasingly violent weather**. In 2012 a series of tremendous storms and floods wiped out rice crops across Southeast Asia, and a genuine, old-fashioned **famine** swept the region. People ate grass and mud, and died by the hundreds of thousands. The images of city streets dotted with emaciated corpses unnerved populations from Adelaide to Ottawa, and people wondered: Could that happen here?

But nothing was done, even as the pressure on food supplies increased and recurrent droughts, floods and storms flailed agricultural regions all over the planet. Developed nations still diverted immense tonnages of grain and corn to making biofuels for their transportation systems, much to the **resentment** of countries where food riots flared almost every week.

When the collapse finally came, it was catastrophic. For two years in a row, the rains failed all across the Indian subcontinent and throughout most of eastern Asia, and tens of millions of farmers saw their fields and paddies turn to dust. The long-dreaded global food crisis had arrived.

In developing nations, the cost of food outstripped even the means of the new middle classes, and rose beyond the wildest dreams of the poor. Famine, with disease in its wake, burned through city and countryside alike. Civil unrest, riots and rebellions met with **savage countermeasures** from frightened governments desperate to maintain order. The disaster drove a rising tide of emigrants to more fortunate nations.

The mass media, the Internet and personal contacts with the dispossessed brought the citizens of the developed world face to face with the human cost of the catastrophe. It awakened a powerful sense of **shared responsibility**, together with widespread guilt over the unbridled consumption that had contributed to so much misery. The crisis also brought home the reality that we were all citizens of the same planet and that, for better or worse, we shared a common future. Was it justice, we asked, that so many should go without, while others had far more than they needed? Was it right to despoil the environment in order to increase consumption, no matter what the cost?

The answer was no. The conviction spread that the better-off could easily get along with less, leave more for those who had little and conserve the environment at the same time. Consumer values began

to shift away from heedless consumption and toward a style of life that emphasized a shared well-being and the careful use and reuse of the world's resources.

The Great Awakening

The famine abated at last, but in a development that confounded the cynics, the **change in values** not only persisted but became more pervasive. The high ideals of Internet-connected youth and the aging baby boomers' growing unease about their legacy fuelled this social and ethical movement, which historians were later to dub "the Great Awakening."

> "But didn't people care about killing all the whales?"

The generation that came of age in the 1960s now turned to volunteer work and poured funds into international foundations. They did not exempt their regimes from responsibility either; they lobbied politicians and bureaucrats for sustainable, international environmental programs and relentlessly pushed governments to take an active role in solving problems.

Though the famine had receded, environmental degradation continued to undermine human health and livelihoods around the world, and voters began to choose environmentally **progressive governments** over reactionary ones. Having acquired power on their promises to act, these regimes now had to follow through. Happily, most did so by asking their citizens, communities and industries to help them find new ways to feed, clothe, house and educate people, and to create an environment that was fit for them to live in. And as people in western nations became more knowledgeable about the underlying causes of hunger, poverty and environmental degradation, they began to take a much more **holistic** approach to these problems and their solutions.

In this new worldview, and in contradiction of an old rule, politics was not local: citizens' demands now strengthened their leaders' political will to find global answers to environmental decay. This led at first to a handful of international agreements that were, inevitably, criticized as being hastily conceived, poorly implemented and too expensive for business to bear. But the accords did set a precedent by proving that the world's countries could, in spite of the naysayers, act together against common threats.

Creating these first agreements taught the world community how much it could achieve by setting up shared environmental standards and by reporting honestly on how well its members complied with them. After this success, it became easier to design more sophisticated agreements and make

them more effective. The first true **achievement** of this approach, and a direct response to the horrors of the famine, was a global ban on making biofuels from corn and grain. Biofuels were not abandoned, however; they would henceforth be produced from palm oil, grasses and wood wastes.

By the middle of the century's second decade, well-supported global foundations were working with governments to provide farmers with fertilizer, high-yield seeds and funding for the much-needed rain ponds and dikes that would help protect crops from drought and floods. There was help as well for putting more land into cultivation and for the added fuel costs of doing so. World food production and reserves at last began to **expand**.

Success in this area raised the hopes of success in others, and the same groups that had re-engineered the food supply now turned to wider horizons. They envisioned new sciences and new technologies that would give us long-term, sustainable food supplies, find better ways to **reuse resources**, help us develop more abundant sources of energy and drastically reduce humanity's carbon footprint.

The world's workforce needed advanced skills and knowledge if this "green wave" was to become a reality, so countries began to train and educate ever-larger numbers of their citizens. Educational systems and industries became allies, and universities created new kinds of advanced degrees in environmental engineering, sustainable technologies and social innovation.

Fortunately, the men and women who created these modern educational systems knew that the future would bring very swift technological changes, and that their systems must be able to keep pace. Accordingly, they designed for the long term and looked not years ahead, but decades. Their work, together with that of newly minted international foundations, created **new perspectives** on governance, on the environment and on the resources that humanity would need for its future well-being and survival.

The flight from too much

Particularly in the developed world, the **flight from consumerism** gathered conviction and momentum. Many people eliminated some of their consumption outright, while others looked for greener alternatives to familiar products. There was little patience with things that did not last, and manufacturers either changed their ways or went bankrupt. Well-built, multiple-use devices became popular; among the first to market were computers that could replace a household's telephones, televisions, video players and music systems at a single stroke. Consumers voted with their wallets and switched to local producers, preferably those that used recycled materials and clean energy.

The **shift** in values did not end there. As 2020 approached, and as the global environment still showed little improvement, there was a growing consumer backlash against products from countries that allowed their industries to pollute. To the alarm of some companies, people now expected them to take responsibility for their products from the raw-materials stage to final disposal. Industries responded by engineering products whose life cycles added new "**value loops**" — reclamation, reuse and recycling — to the traditional production sequence of extraction, processing, manufacturing and disposal.

Nothing, however, could slow the process of global warming, although it did have some advantages to **counterbalance** the harm it caused. The old dream of opening the Northwest Passage, for example, was a reality by 2021 and created new shipping lanes across the top of the world. These shorter, more efficient routes encouraged new trade links among many countries in the northern hemisphere and provided much-needed **relief** from the rising shipping costs that had begun to hinder international trade.

Resources redefined

For resource processing industries, the decline of irresponsible consumerism in the affluent nations meant that resource consumption grew slowly there, or not at all. In developing countries, by contrast, rising overall populations and the expansion of the middle classes helped keep **consumption** relatively high. As long as traditional trade patterns persisted, Canada's resource processors could benefit from strong demand in these economies.

More prescient industry leaders, though, realized that this demand would be falling by 2025 as middle-class attitudes in these countries shifted toward sustainable consumption and development. They began to prepare for the inevitable by shifting their perspective from resource processing to **resource management**, a shift that helped them see more clearly what they had to do to survive. They spun off new companies that could mine waste dumps for raw materials. They invested in renewable energy, in greener forms of non-renewable energy, in new techniques of energy storage and in clean transportation technologies. They applied lavish amounts of R&D to resource reuse and to finding new, green materials they could substitute for older, dirtier ones.

It was none too soon, for in all but the least-developed nations, the era of heedlessly squandered resources was ending. National governments had already removed many of the support programs, subsidies and tax advantages that had formerly promoted irresponsible consumption and the inefficient use of resources, and were **reforming** the world's tax systems in ways that would discourage consumerism. To offset this, they provided incentives for research and for the commercialization of new technologies that would bring the

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concept of "value loops" into the economic mainstream.

At almost the same time, the international community established the first effective **global mechanisms** for regulating humanity's carbon footprint. This was a tremendous achievement, but many countries went even farther: they agreed to "internalize" environmental costs by repairing any ecological damage their activities caused, and to set absolute limits on a growing number of "externalities" — the indirect impacts of their economic activities on the environment and on human health and society.

These were admirable and necessary measures, but not all the results were positive, at least in the short term. In Canada, the increased expense of **complying** with new national and international regulations added to the already-high cost of traditional resource processing. Worse, the stagnant demand for goods, coupled with high recycling rates and the availability of new, substitute materials, had eroded the prices that companies could charge for their traditional products. Domestic and export markets shrank for Canadian producers of raw resources and for semi-finished and finished goods.

These factors, coupled with Canadian society's **rejection** of industries with poor environmental behaviour, led to the downsizing or failure of several resource companies. This caused large layoffs and temporary, widespread unemployment, but governments, educational institutions and the industry provided retraining and relocation programs that soon helped the displaced workers find new jobs.

The radical changes taking place across the Canadian economy also made some skills **obsolete** and sharply raised the demand for new ones. Industries had surpluses of the wrong kinds of labour, while the kinds they did need were in short supply. People with new skills commanded high pay in a seller's market, while those who lacked them seemed condemned to low-wage ghettoes. Income disparities between the skilled and the unskilled widened and there was a noticeable increase in social tensions.

But where Canadian society of the late 20th century might have considered these inequalities perfectly acceptable, the **heightened** sense of social responsibility that followed the Great Awakening did not. There was a strong and ultimately

successful effort to help people learn the skills they needed, keep older workers employed and bring under-represented groups into the workforce.

Greening the world

Much of this period brought difficult adjustments for Canadian resource processors, even though the new environmental standards, regulations and tax systems were usually introduced in a measured and orderly way, and governments rewarded companies that chose to act early. But for the firms that managed to deal with the changes through their normal investment cycles, and by responding creatively to pressures rather than resisting them, the worst was over by 2025.

> And you should try to make life better for people, not worse.

By that year, the introduction of **new technologies** meant that many substances that had hitherto been considered waste could now be converted into resources. Clean technology, biotechnology, nanotechnology, recycling and reclamation were all part of this transformative mix. Biotechnology, for example, promised algae that could use carbon dioxide to produce both animal feed and biofuels, or create microbes that would consume carbon dioxide and produce methane to be captured in closed-loop energy systems. As for our resource companies, the establishment of new technology and industry clusters encouraged them to adopt advanced technologies and more **sophisticated business models**. These clusters included industry suppliers and customers, developers of green technologies, universities, research institutes and key NGOs.

By now, Canada's remaining resource processors had become greener, fewer in number and in some cases larger. The **successful** ones had been nimble and adaptable, and had evolved from traditional extraction and processing companies into efficient **resource managers** and stewards of the environment. Beyond our borders, the global economy had adjusted to the shift away from mass consumption by the wealthy nations, making Brazil, Russia, India and China the destination of many of the world's consumer products. But even in these and other rapidly developing countries, the attitudes of their increasingly large, affluent and well-educated middle classes were also moving toward responsible and sustainable **consumption**.

Oil was still important, but it no longer dominated the energy mix in spite of advances that had made it cleaner to process and use. In Canada, which was more urbanized than ever, long-distance commuting by automobile declined as high fuel prices and congestion taxes encouraged people to live closer to their work or use the new, expanding public transit systems.

Traffic gridlock in the major cities became a thing of the past; some former arteries became pedestrian promenades or were closed to all but small, low-speed electric vehicles. Urban gardens sprang up in former big-box parking lots and buildings sprouted green roofs of shrubs, flowers and small trees. As the generations born after 1980 consumed less, the demand for a better **balance** of work and leisure entered public debate while the number of average workdays per week began to drift from five to four.

The world was still no paradise. In many countries, backbreaking labour remained the price of a day's food. Extreme weather, driven by the changing climate, still drowned or parched millions of hectares of crops every year, in spite of all efforts to protect them. But there were no more famines and, as people's health improved with better food and less pollution, they **suffered less** from sickness.

Most important, for it drove all the other changes, was the widespread acceptance of individual, corporate and **collective responsibility** for the future. This was not universal; throughout the world there were many pockets where the old ways of greed, cruelty and ruthless exploitation still afflicted millions. But in most places, the barometers of **economic success** were no longer material wealth and heedless consumption. Instead, nations measured their worth according to their contributions to humanity's well-being and to the well-being of the environment.

"So it was the famine that made us **change**," said my great-grand-daughter, gazing pensively out the tram window. "It was because so many people died."
"That's right."
"But you knew it might happen. Why didn't you try to stop it?"
"Nobody cared enough," I said.

Expert Advisory Committee

Agriculture & Agri-Food Canada - Leah Soroka
BC Hydro - Jeff Barker, Bruce Sampson
Canadian Chemical Producers Association - Richard Paton
Canadian Manufacturers and Exporters Association - Jayson Myers
Dalhousie University - previously with Rio Tinto Alcan - Ron Nielsen
Forest Products Association of Canada - Avrim Lazar
Industry Canada - Sara Filbee, Jack Smith
Rio Tinto Alcan - Dan Gagnier

Funding Consortium

Agriculture & Agri-Food Canada - Marc Fortin, Gordon Neish, Della Johnston

Alberta Pacific Forest Industries - Al Ward

AMEC Earth & Environmental - Bill Borland

Atlantic Canada Opportunities Agency - Paul-Émile David, Paul Mills, Siddhartha Mookerjea, David Slade, David Thorne, Hermel Vienneau

Dow Canada - Claude-André Lachance

Environment Canada - Abe Finkelstein, Benoit Desforges, Javier Gracia-Garza

Human Resources and Social Development Canada - Lorri Biesenthal, Karen Jackson, Barbara Martin, Lucas McCall

Industry Canada - David Moloney, Tom Wright

National Research Council - Sherif Barakat, Monika Kern, Clement J. Langemeyer

Natural Resources Canada - Christine Donoghue, François Faucher, Mark Pearson, Jai Persaud, Éric Sanscartier

Government of Alberta - Employment, Immigration and Industry - Nick Gartaganis, Gary Haynes, Justin Riemer, Rick Sloan

Government of British Columbia - Ministry of Economic Development - Don Fast, Dan Pantella

Government of Ontario - Ministry of Research and Innovation - Craig Fowler, Alistair Glass, George Ross

Government of Québec - Ministère des Ressources naturelles et de la Faune et Ministère du Développement économique, de l'Innovation et de l'Exportation - Daniel Bienvenue, Pierre Cauchon, Robert Giguère, Michel Guimont, Martin Landry

Government of Saskatchewan - Industry and Resources - Cam Pelzer, Debbie Wilkie

Shell Canada - Charles Slagorsky

Shell International BV - Wim Thomas

Team

Canada Economic Development for Quebec Regions - Manon Brassard, France Pégeot

Economic and Policy Consultant - Derek Ireland

FEDNOR - Louise Paquette

Industry Canada - Céline Audette, Margaret Bailey, René Béchard, Eric Burpee, Steve Cloutier, Jyostna Dalvi, Bruce Drake, Michelle Gagnon, Barry Goodwin, David Louden, Ken Hart, Patricia Hearn, Simona Ioffe, Tim Karlsson, Kevin Machida, François Marcoux, Michelle Marok-Cooper, Gary McGee, John Morin, Chris Piercy, Gerald Robertson, Marc Savoie, Shreya Shahane, Debora Toll, Marie-Christine Tremblay, Gail Whittaker, James Wildsmith

Justice Canada - Anne Boudreau

Norm Willis Group - Norm Willis

OpenConcept Consulting - Ethan Chiddicks, Mike Gifford, Steve McCullough

PricewaterhouseCoopers - Joanne Johnson, Michael Smaglinski, Jeff Sward

Scenarios to Strategy - Arden Brummell, Greg MacGillivray

Treasury Board of Canada Secretariat – Joseph Potvin

Western Economic Diversification Canada - Nadean Langlois, Fiona Salkie

Write Away - Dennis Jones

Workshop Participants

Joel Adams
Elly Alboim
Robert Anderson
Chief Shawn Atleo
Stephen Augustine
Wayne Baird
Wayne Barnes
Jim Basinger
Ray Beckert
Jeff Bell
Jean-Thomas Bernard
Marianne Berube
Dale Black
Steve Bolt
Tara Bond
Peter Brenders
Charles Brimley
Thomas Browne
Joël Bruneau
Michael Burt
Deborah Buszard
Paul Callaghan
Graham Campbell
Trevor Carlson
Ian Carter
Luc Chartrand
Patrick Chevalier
Steffen Christensen
Chrystia Chudcsak
Tim Coates
Eric Cook
Ray Côté
Brent Cotter
Bernard Coulombe
Bill Coulthard
Craig Crawford
Robert Cutler
Ted de Jong
Robert Deline
Catherine Demers
Hervé Deschênes
Brian Dilling
Joseph Doucet
Jérôme Doutriaux
Peter Dunker
Kevin Dunn
Charlene Easton
Jessica Ellison
Brian Emmett
Tom Facklam
Cyril Farrell
Andrew Fedora
Abe Finkelstein
Keith Fortowsky
Brad Fournier
Sarah Jane Fraser
Scott Fraser
David Fung
Richard S. Gray
Wendy Hansen
Scott Harper
Billy Hewett
Mary Ellen Hodgins
Judy Hughes
Ahmed Idriss
Waynes Inch
Marc Jaccard
Ann Janega
Michel Jebrak
R.M. (Rick) Jeffery
Daryl Jennings
Danielle Johnston
Paul Johnston
Bob Jones
Chris Kanters
Jerry Keller
Brenda Kenny
Archie Kerr
Clare Kirkland
Kurt Klein
Cheryl Knight
Darrin Krouger
Stephen Kukucha
Manon Larocque
Greg Lawrence
Ronald Layden
David Layzell
Robert Lee
Maria Lepage
Barry Lesser
Adam Levine
Wade Locke
Helmut Mach

George Mallay
John Mann
Vincent Martin
Francine Masson
Gerrit Maureau
Don McCabe
Lucas McCall
Rick McConomy
Rachel McCormick
Bruce McCrae
Ron McCulloch
Ed McDonald
John McDougall
Jim McNiven
Axel Meisen
Bente Molenaar
Calvin Mulligan
Alex Munter
Stephen Murgatroyd
Roger Nicolet
Andy Niegel
Jean Nolet
Kirk Osadetz
Dave Oxley
Robert Paehlke
Gilles Paquet
Sharmila Pathmanathan
Réal Pelland
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Adrien Pilon
Reg Plummer
Joseph Potvin
Todd Pugsley
Jim Rader
Don Reimer
Chet Reynolds
Collette Rivet
Darcy Ross
P. Carey Ryan
Ziad Saad
Jack Saddler
Stephen Sampson
Jim Savage
Dave Schwass
Zack Semaine
Leonard Shaw
Neil Shelly
Hélène Shireff
David Showell
Alvin Singh
Indira Singh
Surindar Singh
Charles Sirois
Tara Smolak
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Jiammim Tang
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Jean-Luc Trahan
Tom Vair
Prasad Valupadas
Crina Viju
Claude Villeneuve
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Jeff Walker
Iain Wallace
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John Wiebe
Henry Wiegel
Lori Wilkinson
John Williams
Robin Woodward
Andy Woyewoda