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2040 Vision: BC and Climate Change

November 4, 2009
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Imagine that it's the November launch of the 2040 ski season at Whistler Blackcomb. Like every other B.C. business, the resort is grappling with the ravages of climate change. But Whistler is coming off a busy summer, mostly thanks to throngs of locals attracted to draws such as its mountain-bike park. As in scorching August, a month miraculously free of major forest fires, many of the visitors piling into the village's hotels, restaurants and bars are from B.C. and Washington.

The forecast calls for yet another mild winter, and the ski slopes don't hold snow like they once did. So Whistler is making its own when scarce water supplies allow. It has also groomed its runs so they can open with a thin sheet of snow, and has strung chairlifts high into the still-powdery alpine. Beyond these climate adaptations, Whistler is adjusting to life in a low-carbon world. A micro-hydro project on the river dividing Whistler and Blackcomb mountains yields enough renewable energy to offset the power used by the resort's winter and summer operations.

In fact, Whistler is already doing everything you just read. That includes the single-turbine hydro project – a partnership with Longueuil, Quebec-based Innergex Renewable Energy and Vancouver's Ledcor Power Group – that switches on this month and will sell 33.5 gigawatt hours of electricity annually to BC Hydro. Planning manager Arthur DeJong says he and his environmental team are trying to strike a balance between overplaying and underplaying the effects of climate change. For Whistler, that means becoming a year-round destination and sustaining skiing through the middle of the century. But it also means reducing greenhouse gas emissions that threaten to cook the planet.

"Our long-term goal is to have a zero operating footprint, meaning no carbon and no waste," DeJong says. "It's all about doing it, as opposed to expecting others to or making statements about the environment."

Thirty years out – too soon for Jetsons scenarios but far enough away for industry to retool – how will global warming change the B.C. economy? Nobody knows the answer to that question. But when BCBusiness asked academic experts, business leaders, environmentalists and other interested parties how our province might look in 2040, they kindly played along. Their responses revealed great challenges – and generous opportunities if we can adapt to whatever's coming.

B.C. also has the chance to set an example. John Robinson, a professor at UBC's Institute for Resources, Environment and Sustainability, says Europe is regarded as a leader in sustainable development. But as he points out, European countries tend to be consumers rather than producers of resources and have stable or declining populations. By contrast, B.C. better reflects global trends because it has a resource-based economy and a growing population. "If we can figure out sustainability in that context, that's way

more interesting to developing countries and most fast-growing economies around the world than the European model," Robinson says.

To set the scene for 2040, let's look at what might happen to the weather over the next three decades. Regional climate models suggest that B.C.'s average annual temperature will rise 1.7 degrees Celsius by the 2050s. This is roughly in line with the expected global increase. Meanwhile, the province's average annual precipitation is projected to climb six per cent, and the models predict wetter winters and drier summers.

A degree or two may not sound like much. But Trevor Murdock, a climate scientist at the University of Victoria's Pacific Climate Impacts Consortium, notes that this was all it took to bring North America out of the last ice age.

Then again, there's always the chance that the models are too conservative. For one thing, climate change in the Arctic is moving faster than scientists anticipated. But the long-term trend for B.C. is clear: it's going to get warmer, especially in the north during winter and on the coast during summer.

The impact on water will be profound. Many areas of B.C. can expect less snow and a rise in the elevation at which it can survive winter, says Stewart Cohen, a Vancouver-based senior researcher at Environment Canada's adaptation and impacts research division. High temperatures will also eat away at our glaciers, which are shrinking like their counterparts elsewhere. One dramatic consequence: this past August, searing heat had some B.C. rivers experiencing peaks in snow-melt runoff that normally occur in May. "As a short-term phenomenon with this warmer climate, we're probably going to see more of these glacial-melt flows," says Cohen, who has contributed to reports by the Intergovernmental Panel on Climate Change. "But then eventually, the reduction in the amount of water stored in glacial ice will lead to a reduction in stream flows in summer."

Another water-related effect of climate change is a rise in sea level. Cohen says this will be especially troublesome for the coastal area south of the Fraser River, which includes Delta and Richmond. But other parts of the B.C. coast won't fare as badly because the land is still rising, a lingering reaction to having cast off the weight of ice-age glaciers.

So far in B.C., forestry has taken the biggest economic and ecological hit from climate change. According to the provincial government, the mountain pine beetle has killed or damaged 14.5 million hectares of trees, an area more than four times the size of Vancouver Island. The infestation spun out of control partly because warmer winters failed to destroy it. (To kill the pine beetle, temperatures must plunge to minus 25 degrees Celsius in late spring or early fall, or stay below minus 40 for a long stretch during winter.) As Cohen observes, one side effect of all this dead wood is a higher risk of forest fire, which costs millions to fight and hurts tourism, parks and wildlife habitat.

Such devastation could be just a teaser for the chaos ahead, and governments and NGOs are thinking about adaptation and mitigation. Besides instituting its carbon tax, the province has assembled a climate action team and unveiled a clean energy blueprint. (However, September's budget update also included deep cuts to the Environment Ministry and the Climate Action Secretariat.) One of Metro Vancouver's goals is to be carbon-neutral by 2012, excluding solid waste, and municipalities from low-lying Delta to forested Prince George are hatching their own plans. In the eastern Interior, the

Columbia Basin Trust is working with local communities to explore how they might adapt to climate change. A shared concern is the resilience of infrastructure to hazards such as forest fire, flooding and extreme rainfall.

If they want to survive and even thrive, B.C. businesses need a plan too. They've started digesting the carbon tax, which stands at $15 per tonne of carbon-dioxide emissions and will hit $30 in 2012. Deborah Harford, executive director of SFU's adaptation to climate change team, says business is often ahead of government when it come to adapting to climate change.

"Wherever you look at an industry that is dependent on natural resources in some way, they're already dealing with it," Harford adds. "It's quite shocking, really, the big gap between public awareness and top-down leadership, and how much is actually being done on this under the radar."

What business may not realize is that water will become its most precious resource. Robert Sandford is director of the Western Watersheds Climate Research Collaborative at the University of Lethbridge and chair of the Canadian Partnership Initiative for the UN International "Water for Life" Decade. His new book, Restoring the Flow: Confronting the World's Water Woes, examines Canada's place in a looming global crisis. Unlike many other countries, Sandford says, Canada has enough water. And until now, it has mostly avoided the supply problems that plague such regions as the Middle East and the U.S. Sunbelt.

But because its population is in the south and its water is in the north, Canada can expect to suffer a similar fate as it keeps growing. In his frequent addresses to business and other groups, Sanford has learned that people have trouble grasping this idea. "I found it particularly difficult in the business community because the myth there is that we have 20 per cent of the world's water – what the hell could be the problem?" he says. "But it's not where the people live. And we have very dry areas, particularly in British Columbia."

Adequate water is essential to B.C. industries such as mining and oil-and-gas exploration, and all sectors depend on hydro power for much of their energy. Water is also the lifeblood of agriculture, which Sandford says will become increasingly important to the Canadian economy. "The world is going to be relying on this country more and more for food supply."

B.C. could stand to benefit from a longer growing season, says Art Bomke, an associate professor at UBC's faculty of land and food systems. Also, warmer weather may open up new opportunities in the north. Two promising locations for vegetable crops are the Peace River area and the Fraser benchlands between Quesnel and Williams Lake. Meanwhile, the Okanagan, already home to a fruit and wine industry generating hundreds of millions of dollars annually, could see yields multiply in the decades to come as California dries out.

"As long as the land base is there – as long as we don't convert it into shopping centres and housing developments – I think we have the flexibility to follow the market on those things," Bomke says.

But B.C. must also forge a new relationship with water. In the arid Okanagan, for example, farmers and vintners compete with urban and recreational development for limited supplies.

Keeping everyone happy means that nature's needs can get overlooked, Sandford warns. His worst nightmare: a prolonged western Canadian drought coincides with climate-change-induced blows to water supply and quality. Fortunately, the Columbia Basin Trust and the Kelowna-based Okanagan Basin Water Board are taking these threats seriously.

Another food industry that can expect big changes by 2040 is fisheries, says Bill Wareham, senior marine conservation specialist with the David Suzuki Foundation. Wareham says the forecast from many scientists is that higher ocean temperatures will drive salmon and their fellow cold-water fish north to Alaska. Also, big runoffs from faster spring melts can damage spawning beds. And if those melts lead to low summer flows in B.C. rivers, the warmer water may kill fish. Fewer salmon near our shores equals less food for their predators. By mid-century, Wareham says, some local fish populations could be gone altogether.

But all is not lost. With warm-water species such as squid and mackerel showing up off B.C. recently, Wareham sees an opportunity to reinvent the commercial fishery by pursuing them. He says pulling off that costly effort will depend on figuring out what's in the ocean and whether it can be caught sustainably.

Wareham is skeptical about the future of salmon farming, for the simple reason that oceans are depleted of sardines, herring and other forage fish it requires for feed. But he does see a place for shellfish aquaculture on the central and north coasts. Assuming that oysters and other bivalves can grow there in numbers – First Nations and the province are currently running several pilot projects – these isolated farms would face transportation challenges. "It's a necessity to have increased production at an economy of scale that's close to markets," Wareham says. "And that's the difficult equation."

When it comes to moving things around in 2040, having Canada's largest port in B.C. will be a big advantage. Transportation expert Anthony Perl, director of SFU's urban studies program, doesn't think climate and energy crises will necessarily have scuttled global trade. And because marine transport is the lowest-impact way to ship goods, Perl says, it will carry things that used to travel by land or air.

In his estimation, though, Vancouver won't remain an effective gateway unless at least three-quarters of its overland trade moves by train. Perl says an electric rail network – electricity can come from multiple sources, many of which are not carbon-dependent – will be essential for the port to function. If we don't build one, Seattle, Oakland or Long Beach will, he predicts: "One or more of those [ports] is going to figure this out, and I hope we're among the leaders as opposed to the laggards."

To keep business chugging along, B.C. will need alternative sources of energy as traditional sources dwindle and environmental rules tighten. Here it has yet another advantage. Jonathan Rhone is CEO of Vancouver-based Nexterra Systems Corp., which makes gasification systems that allow users to convert biomass into their own

heat and power. He's also head of the B.C. Cleantech CEO Alliance, an informal group of leaders from the province's green-energy cluster.

Rhone says these companies are in the right place for many reasons. Besides a strong entrepreneurial class and top universities, B.C. has some of the world's best renewable energy: water, wind and vast quantities of biomass fibre in its forests. "We've got the ability to be innovators, and we've got the ability to be generators and exporters of energy as well," Rhone says.

At home, B.C.'s cleantech sector could deliver widespread benefits. Nexterra recently announced a project with the University of Northern B.C. in Prince George: a gasification plant that transforms local wood residue into gas to heat the campus. Rhone says the plant will become part of a living laboratory that may spark more regional innovation. "As we commercialize technologies, they can be adopted and rolled out and replicated commercially in municipalities across the province."

As for the future of cleantech, Rhone is willing to look ahead a decade. Last year, the global sector was a US$155-billion industry, according to the UN. Renewable energy snagged more investment from business and government than fossil-fuel technologies, not including another US$35 billion spent on large-scale hydro. B.C.'s 100-odd cleantech firms employ upward of 4,000 people and generate about $1 billion in annual revenues, Rhone says. By 2020 he wants the province to be home to hundreds of green-energy companies exporting products, services and technologies around the world. His target numbers: $6 billion to $8 billion in revenues and as many as 25,000 employees.

Not everyone is so bullish. Jock Finlayson, executive vice-president of policy for the Business Council of B.C., admits that demand for environmental goods and services will grow. But the economist says it would take buckets of private and public investment in research and development to make B.C. a global green-tech player. Instead, Finlayson thinks the provincial sector may contribute to the development of sophisticated products and solutions. "But the real commercial takeoff and production of these things is likely to occur somewhere else, because we don't produce much here in terms of manufactured products," he says. "I think we can produce more over time, but that hasn't been the tradition."

To realize its potential, B.C. has some catching up to do on sustainability, says UBC forestry and landscape architecture professor Stephen Sheppard. At the university's Collaborative for Advanced Landscape Planning, Sheppard and his colleagues create possible B.C. climate-change scenarios as far out as 2100. By North American standards, Vancouver is a centre for sustainable design and urban planning, he says. But B.C. trails countries such as Austria and Germany, where, for instance, many communities use biomass to heat their homes. With policy changes that encourage smarter energy use, Sheppard says, the province could quickly become a frontrunner. "I think you could look to B.C. taking some leadership on the bio-economy and bio-energy."

One economic opportunity is the green retrofitting of homes. Sheppard says we often think of sustainable design as new buildings, but many of the houses that will be around in 2040 are already here. Tearing down a home that can be renovated to build a new one squanders precious energy, he adds. There's much we can do to update existing

housing, from dividing large dwellings to installing rooftop solar generators for electric cars. “It’s a question of providing access to these technologies, designing our communities to accommodate them . . . and making noise about getting people to start making those changes,” Sheppard says. “The barriers are in our heads.”

As 2040 approaches, B.C. might also have the chance to boost its manufacturing base – all while fighting climate change. Just ask William Rees, a professor at UBC’s School of Community and Regional Planning. Rees is co-creator of the ecological footprint analysis, which measures demand for resources and the planet’s ability to meet it. With human consumption outstripping natural supply, he says, it’s time for government to mandate true-cost pricing of goods and services.

This would mean bringing in a tax to account for the cost of repairing the environmental damage done by making a product – transportation from producer to consumer, for example – and preventing any future destruction that product causes. “People should get a market signal that will redirect their expenditures into those things that produce the least ecological damage costs,” Rees says.

According to Rees, true-cost pricing could diversify B.C.’s resource-based economy, which is vulnerable to fluctuating commodities prices. Slap an equivalent tariff on environmentally hostile imports and suddenly opening a factory in Langley rather than Guangzhou makes a lot of sense. “By imposing that tariff at the border, you would encourage local manufacturers to get back in the marketplace because they could compete fairly,” Rees says.

Of course, this and other responses to climate change will come at a cost. They may mean less travel, fewer Ikea bookshelves and Atlantic lobster dinners, and homes and cars that are more expensive to buy but cheaper to operate. And the privilege of driving to Whistler, then shooting far up the mountainside to find skiable terrain? Well, only tomorrow knows for sure.