CANADA WEST FOUNDATION GOING FOR GOLD PROJECT

The Green Grail

ECONOMIC DIVERSIFICATION AND THE GREEN ECONOMY IN WESTERN CANADA

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Executive Summary

This paper examines the connection between the green economy and its potential to contribute to the diversification of the western Canadian economy. For our purposes, the green economy is defined as economic activity that is directly related to improving environmental sustainability.

Although the paper assumes that green processes, products and services have the potential to generate wealth and increase the diversity of the western Canadian economy, the paper does not argue in favour of specific green initiatives or their environmental effectiveness.

Measurement Challenges

The idea of a "green economy" has received a lot of attention in recent years, but it remains a slippery concept that means different things to different people. On an empirical level, there is no standard method of calculating the size and scope of the green economy. Estimates of the green economy range from 1% to 10% of economic output, leaving a lot of room for uncertainty about its economic impact.

In addition, we do not currently have an accurate way to measure the degree to which green activity does or does not result in a more diverse economic base. For example, the greening of an existing industry does not necessarily increase the diversity of an economy. As a result, there is no clear line between the already fuzzy concept of green economic activity and green economic *diversification*.

These measurement difficulties are a double whammy that renders meaningful estimates of the green economy's impact on diversification impossible at this time. What is needed is a coordinated effort involving Statistics Canada that will yield a working definition of green activities that is then applied to the Canadian economy at both the national and provincial level and across economic sectors. The resulting database should be updated annually. Once this is available, more work can be done to assess the effects of green activities on economic diversification.

Growth Potential

Despite these methodological limitations, it is safe to assume that green diversification has the potential to increase the diversity of the West's economy, even if it is not yet (given the very limited measures we have) a major factor. If the green economy is to become a larger component of the overall economy, and if it is to have a significant influence on the region's economic diversity, there will have to be large-scale changes to how the economy operates, and to what it produces. With that said, successful green ventures that grow the economy, provide jobs, maintain or expand the customer base or increase the range of products and services produced in the West are beneficial to the regional economy even if their overall impact is modest.

Encouraging Success

In an effort to learn more about the state of western Canada's green economy, we spoke to representatives from eight western Canadian companies active in the green economy and, in particular, green energy. Although those we interviewed are quite optimistic about the future of the green economy because of a growing cultural consciousness around environmental issues, they identified a number of barriers to success. These include: 1) the hurdle of commercialization and the lack of venture capital at this critical point in the business development process; 2) a domestic market that tends to shy away from homegrown options in favour of what can be imported from Europe, the US or Asia and the tendency among Canadians to see early adoption as too risky; and 3) the preference for large and capital-intensive energy (especially electricity) projects over facilitating small-scale additions to the grid.

The theme underlying all three of these issues is the need for government to help push green products and services "over the finish line." The private sector is confident that it can develop successful (i.e., profitable) green ventures but it also feels that some policy changes would greatly improve the odds. Policy recommendations mentioned by interview participants include a strong government mandate on environmental issues, the use of feed-in electricity tariff programs, the drafting of renewable energy portfolio standards and increased funding for technology development programs that assist companies to transition to the commercialization stage.

Preface

> "Natural capitalism is about choices we can make that can start to tip economic and social outcomes in positive directions. And it is already occurring—because it is necessary, possible and practical.
>
> — Paul Hawken, Amory Lovins, and L. Hunter Lovins, *Natural Capitalism: Creating the Next Industrial Revolution*

The West is home to one of the greatest stores of natural capital in the world. The region overflows with natural beauty, natural resources, and "ecological goods and services." Harvesting this bounty, as well as maintaining it, are at the core of the region's comparative advantage, economic prosperity and quality of life.

There are many reasons for "going green," but four stand out in the context of ensuring western Canada's international economic competitiveness: 1) jurisdictions that do not take action on environmental issues may be penalized by a global marketplace and policy space that are increasingly demanding greener processes and products; 2) there are significant direct and indirect economic costs created by degrading a jurisdiction's natural capital and the ecological goods and services it generates (e.g., if the water supply becomes contaminated); 3) there are opportunities to participate in new markets for green products and services; and 4) businesses can save money (and therefore gain a competitive edge) through less wasteful production systems. In addition, there are quality of life factors that argue in favour of greener practices that, while of value on their own, also play a role in attracting and retaining footloose labour and investment.

At the same time, western Canada is still trying to crack the old chestnut of economic diversification in order to reduce the region's exposure to volatile commodity markets and the boom and bust cycle they perpetuate. The principle is the same as diversifying a personal financial portfolio (assuming you are lucky enough to have one) such that it is not overly dependent on any one asset. You may experience more modest returns by investing in a wider variety of assets, but the payoff is less risk and less volatility—at least in theory.

The same is true for economic diversification on a regional scale. The goal is to reduce risk and volatility by increasing the number of sectors able to drive the economy forward such that, if one is in decline, the entire economy does not come down like a house of cards. And, ideally, you do this not by ignoring one sector in favour of another, but by simultaneously growing a wide range of sectors. The West currently has a somewhat diverse economic portfolio, but anxiety remains that the job of diversification is not only incomplete, but something that will never be complete as the region is forced to constantly update its economic strategy.

Others, however, argue that diversification is at best a distraction and at worst a wild goose chase that undermines tried and true economic strengths. According to this school of thought, economic development in the West should "stick with what we know" and not seek to branch out into new areas that suck time and energy away from traditional industries. Entrepreneurs and investors will make their own decisions and the market will decide which strategy is best. But it is not quite this simple when it comes to public policy. Which perspective should a government adopt? Should a government "dance with the one that brung it" or should it seek out some new partners at the economic dance?

This paper cannot resolve this debate (though it is guided by the belief that more diversification is better than less). What the paper is able to do is bring together thinking about the economic opportunities presented by the "green" economy with the quest for greater economic diversification in western Canada. The central question is: can opportunities presented by the green economy help diversify the western Canadian economy?

Unfortunately, while this question is straightforward, answering it is not. Useful and accurate measures of green economic activity are only now beginning to be developed. As a result, we must rely on anecdotal evidence and theoretical possibilities rather than hard evidence. Nonetheless, examining the potential impact of the green economy on diversification is a worthwhile endeavour and one that will help inform that broader debate about the benefits of diversification and which economic development strategy is best for the West.

Robert Roach and Shawna Ritchie
Calgary, March 2011

1. Introduction

> "What kind of world will we have when our economy is based on increasing the capacity and efficiency of our existing communities … on increasing (not just slowing the rate of depletion) the capacity and health of our farmlands, watersheds, and fisheries? What happens when each year leaves us with a healthier, wealthier world?"
>
> —Storm Cunningham, *reWealth: Stake Your Claim in the $2 Trillion reDevelopment Trend That's Renewing the World*

This paper examines the connection between the green economy and the diversification of the western Canadian economy. For the purposes of this paper, **the green economy is defined as economic activity that is directly related to improving environmental sustainability**. It includes green products, services, and production processes.

The paper is not prescriptive in the sense of arguing in favour of specific green options, but it does suggest that green products, services and processes have the potential to both grow and diversify the western Canadian economy.

The paper's focus on economic diversification in western Canada (BC, Alberta, Saskatchewan and Manitoba) is rooted in the longstanding recognition that the regional economy will benefit in the long-term from a more diverse economic base. Green economic options are a relatively new, but potentially powerful, way to add to western Canada's economic repertoire. The questions at hand include:

→ Can we measure the size and scope of the green economy in western Canada?

→ What effect will the green economy have on economic diversification in western Canada? Can this be measured?

→ How can public policy support the development of green economic enterprises?

A lack of readily available standard empirical measures of green economic activity restricts our ability to accurately assess its size and scope and, in turn, its impact on economic diversification in western Canada. Nonetheless, the best information available is presented to provide some context. The paper then discusses a set of case studies of green economic activity in western Canada with an eye to identifying how public policy can assist the development of the green economy and, thereby, further the cause of economic diversification. The paper's conclusion looks to the future and suggests how the green economy and economic diversification may evolve in the years ahead in western Canada.

2. Defining the Green Economy

> "Smart businesses understand that their competitive advantage lies at the cutting-edge of the green shift."
>
> —John-David Phyper and Paul MacLean, *Good to Green: Managing Business Risks and Opportunities in the Age of Environmental Awareness*

There is no standard definition of the green economy.[1] Some use the phrase to describe a radical shift away from capitalism and markets based on a renewed relationship with nature and a strong emphasis on social justice.[2] We refer to this as the *ecological perspective*. Others situate the green economy firmly within the current market-based global economy; in this sense, the green economy is akin to the knowledge economy in that it is at once a distinct sector on its own and a component of many other sectors. We refer to this as the *market perspective*.

An example of the ecological perspective is provided by Earth Policy Institute President Lester Brown: "[a]n environmentally sustainable economy—an eco-economy—requires that the principles of ecology establish the framework for the formulation of economic policy and that economists and ecologists work together to fashion the new economy.…We have created an economy that cannot sustain economic progress, an economy that cannot take us where we want to go. Just as Copernicus had to formulate a new astronomical worldview after

[1] As this excerpt from notes taken at a UN meeting about sustainable development attests, the green economy remains a concept in flux: Taking up the topic of "a green economy in the context of sustainable development and poverty eradication," many speakers observed the lack of a clear consensus agreement on the term 'green economy.'… States were, in the words of one speaker, in a position of "constructive doubt"; doubtful of the merits of discussing a new economic paradigm, yet willing to engage constructively towards a mutual understanding. They acknowledged that, up to now, States had yet to reach an understanding of the scope, benefits, risks and costs of a green economy.… As they grappled with the subject, speakers offered their thoughts on what they thought a green economy was. One referred to it as a "green new deal." Another called it an era of harmony between humans and nature, in which conservation and environmental protection were incorporated into economic activities. Others spoke of a wave of change in people's consumption and production patterns. Still others described it as an economic system based on clean and renewable energy, of trade based on sustainable development and of low-carbon urban living (http://www.un.org/News/Press/docs/2010/envdev1141.doc.htm).

See also, Globe Foundation 2010: "The concept of a 'green economy' has become very popular in current political and social discourse, and the term has come to mean different things to different people" (p. 3); and ECO Canada 2010: "At present, no universal or shared framework exists to consistently define or classify green jobs or green economic activity on a national scale, in a Canadian context" (p. 8).

[2] For some, the neoclassical economics that underpins the current Canadian and global economy is completely out of synch with the limitations of the earth's ecosystems. Hence, neoclassical economics and the economic system it has spawned must be jettisoned in favour of an eco-economy. See Nadeau 2002: "The conception of the relationship between the parts (economic actors and firms) and wholes (market systems) in neoclassical economics is completely different from and wholly incompatible with the actual dynamics of the relationship between parts (organisms) and whole (ecosystem or biosphere) in the global environment." In other words, economics got us into our current predicament (assuming you accept that we are in a predicament) and cannot get us out of it. See also Hawken 2005: "If every company on the planet were to adopt the best environmental practices of the 'leading' companies … the world would still be moving toward sure degradation and collapse.… Rather than a management problem, we have a design problem, a flaw that runs through all business" (P. xiii). As noted, not all conceptions of a green economy require this overturning of neoclassical economics. Indeed, for others, the efficiency and profits promised by green, but still neoclassical, economics demonstrate the they can not only live together, but thrive together.

several decades of celestial observations and mathematical calculations, we too must formulate a new economic worldview based on several decades of environmental observations and analyses.…Converting our economy into an eco-economy is a monumental undertaking. There is no precedent for transforming an economy shaped largely by market forces into one shaped by the principles of ecology" (Brown 2001).

An example of the market perspective is provided by the US Department of Commerce: "[t]he Obama Administration has a strong commitment to fostering the development of a green economy; that is, a clean and energy-efficient economy. This means encouraging the development of green products and services that contribute to economic growth and improve this nation's environmental stewardship. The jobs that are created and supported in businesses that produce green products and services, are green jobs" (US Department of Commerce 2010).

For the purposes of this paper, green economic activities are those that are *directly* related to improving environmental sustainability. This includes protecting natural and agricultural land, conserving water, reducing pollution and waste (including the emission of greenhouse gases) and respecting ecological processes and limits. The linkage between the burning of fossil fuels and climate change has put energy production and use in the green spotlight. Hence, energy conservation and the drive to switch to low-carbon energy (i.e., alternative or "clean") sources of energy often dominate discussion of the green economy. Nonetheless, former environmental headliners such as deforestation, nuclear waste, and pollution remain important environmental issues that the green economy is intended to address.

There are two broad streams within the green economy. The first involves developing, marketing and selling a green product or service. This includes everything from biodegradable bags for picking up after dogs, recycled paper products and hybrid cars to environmental assessment consulting services, recycling pick-up and carbon offset schemes. The second stream involves reducing the environmental impact of industrial processes (including end-of-life practices that commit a business to manage the full lifecycle of a product) and human organizations. This includes everything from a manufacturing plant switching to solar power and a warehouse installing a green roof to using less paper in an office and reducing the amount of packaging that products come in. Both streams are important, but the former is likely to have a much greater influence on economic diversification. With that said, if greener operations and processes can help attract customers in new markets by reducing input costs, by taking advantage of consumer demand for products and services that come from greener companies,[3] or by meeting government standards, both streams have the potential to influence diversification.

[3] As Jeffrey Hollender and Bill Breen of Seventh Generation (a natural household products company) note: numerous "companies are innovating powerful ways to build market share and grow revenue by confronting confounding social and environmental challenges" (Hollender 2010, p. xvii).

It should be noted that the rationale for, the motivations behind, and the actual environmental benefits of green economic activities are beyond the scope of this paper. As such, we do not present a position on how much change needs to happen (i.e., do we need a completely new economic system or is greening the current system good enough?), we do not attempt to determine which new green products and services are the most green (i.e., best for the environment), and we do not comment on what balance should be struck between greening the economy and maintaining jobs and economic growth in non-green or less green sectors.[4]

OTHER DEFINITIONS OF THE GREEN ECONOMY

Globe Foundation

In a report funded by the Government of BC, the Globe Foundation defines the green economy as "a fast-growing economic development model that focuses on the creation of green jobs, the promotion of real, sustainable economic growth, and the prevention of environmental pollution, global warming, resource depletion, and ecological degradation. Integral to the green economy are those elements of traditional economic sectors that are in transition to lower-carbon energy production and increased energy conservation in order to reduce greenhouse gas (GHG) emissions in to the biosphere." … "BC's green economy is one that is powered by green technologies and practices in every dimension of society and as such, one that generates green jobs, creates more sustainable businesses, and stimulates low-carbon investments province-wide" (Globe Foundation 2010, p. 6).

United Nations

The United Nations Green Economy Initiative defines "greening" an economy as the "reshaping and refocusing policies, investments and spending towards a range of sectors, such as clean technologies, renewable energies, water services, green transportation, waste management, green buildings and sustainable agriculture and forests. Greening the economy refers to the process of reconfiguring businesses and infrastructure to deliver better returns on natural, human and economic capital investments, while at the same time reducing greenhouse gas emissions, extracting and using less natural resources, creating less waste and reducing social disparities" (Green Economy Initiative 2010a).

[4] For an example of these sorts of judgments, see Phyper 2009: "there are a few key attributes that distinguish 'good' companies from truly 'green' companies.... [C]ompanies that demonstrate leadership through sustained action on global environmental challenges and achieve business success in the process also succeed in overcoming two problematic trends that continue to plague the rest of the pack. The first is 'cosmetic environmentalism' whereby companies focus on easy to do activities that provide an aesthetic fix, e.g., recycling program at Head Office or purchasing offsets for CEO travel, instead of digging deeper and developing a good understanding of their business 'risks and opportunities' associated with environmental issues.... The second issue: environmental management is typically fragmented in 'silos' of activity..." (p. xi).

Tacking on the goal of "reducing social disparities" is common among the definitions of green economy and is rooted in the idea that sustainability must be broadly defined to include stewarding not only natural capital, but social and human capital as well. In this context, "sustainable" jobs and a generally less exploitative approach to economics are seen as a way to rebalance inequitable social relationships. This crops up, for example, in the definition of a "clean technology company" that appears in a report for Sustainable Development Technology Canada: "A company that is predominantly engaged in the development and marketing and/or use of its proprietary technology to deliver products and services that reduce or eliminate negative environmental impacts, *and address social needs*; while delivering competitive performance, and/or using fewer resources than conventional technologies or services" (emphasis added, Russell Mitchell Group 2010).

The following definition of the green economy from another UN Green Economy Initiative document summarizes the presumed transformative power of the green revolution: "A Green Economy is one in which the vital links between economy, society, and environment are taken into account and in which the transformation of production processes, production and consumption patterns, while contributing to a reduction per unit in reduced waste, pollution, and the use of resources, materials, and energy, waste, and pollution emission will revitalize and diversify economies, create decent employment opportunities, promote sustainable trade, reduce poverty, and improve equity and income distribution" (Green Economy Initiative 2010b).

ECO Canada

A more practical definition is provided by ECO Canada: the green economy is the "aggregate of all activity operating with the primary intention of reducing conventional levels of resource consumption, harmful emissions, and minimizing all forms of environmental impact. The green economy includes the inputs, activities, outputs and outcomes as they relate to the production of green products and services" (ECO Canada 2010, p. 3). The ECO Canada report goes on to identify "the top areas of opportunity in Canada within the emerging green economy [as] renewable energy and energy efficiency; buildings, retro-fitting and construction; transportation and alternative transportation; and waste recycling and waste management" (p. 6).

The Link Between the Green Economy and Energy

Not that long ago, the biggest criticism of using oil, gas and coal was that doing so pollutes the air and, as the 1989 Exxon Valdez oil spill demonstrated so dramatically, water and shorelines as well. These issues remain (witness the BP oil leak in the Gulf of Mexico that dominated the news in the Spring of 2010). They have, however, been supplanted in large part by the "war on carbon." In the post-"An Inconvenient Truth" world, oil, gas and coal are seen as a problem because burning them releases greenhouse gases into the atmosphere that, according to many scientists, will cause widespread devastation.

Because of this, and the pervasiveness of oil, gas and coal in the global energy mix, the idea of a green economy is intimately linked to the idea of a low-carbon (or, for some, no carbon emissions at all) economy. This is, for example, the main driver behind the Obama Administration's support of the green economy. Nonetheless, there is more to the green economy than the pursuit of lower greenhouse gas emissions. Reducing waste, stewarding the world's natural resources, preserving habitat, and a wide range of other environmental goals are central to the green economy.

With that said, because of the importance of energy to modern life and the ongoing global quest for alternatives to fossil fuels in the name of addressing manmade climate change, it is difficult to imagine a definition of the green economy that does not place a premium on the shift toward a low-carbon economy. Indeed, finding "cleaner" energy sources and reducing greenhouse gas emissions have become the poster children of the green economic movement.

With regard to economic diversification, green energy is most relevant when it involves new energy products and services rather than improved environmental outcomes in existing energy industries. While important on an environmental level, the greening of existing fossil fuel energy production processes does not add to economic diversification unless doing so opens up new foreign markets.

3. Economic Diversification in the West

> "The current search for economic development and diversification has been on the economic and political agenda of western Canadians for decades. Whether it was the drive to find a greater mix of agricultural products in the 1920–50 era or the building of a world-scale petrochemical industry in the 1970s and 80s, the objectives are the same—the creation of employment opportunities and the development of a more stable economy which would be less vulnerable to the vagaries of world commodity markets."
>
> —Canada West Foundation, "Economic Development and Diversification in Western Canada," 1987

Like the green economy, economic diversification is a somewhat slippery concept that means different things to different people in different contexts. It can, for example, refer to adding variety to a personal investment portfolio, to a "[c]orporate growth strategy whereby a business builds its total sales by acquiring or establishing other businesses that are not directly related to the company's present product or market,"[5] to "spread[ing] industrial commitment over a large range of activities so that there is no overdependence on one,"[6] or exporting to a wider variety of countries and customers. This paper is concerned with the latter two forms (i.e., industrial diversification and market diversification). Furthermore, we do not consider adding value-added production or new products to existing industries (i.e., vertical diversification) to be true industrial diversification (though it may be worthwhile for other reasons). Vertical change, however, counts if it increases market diversification.

Unfortunately, the jury is still out about whether or not industrial diversification is indeed the best economic strategy. Some argue that the best bet is to focus on your comparative advantages and "stick with what you know." For the West, this means harvesting and selling natural resources. According to this school of thought, and using Saskatchewan as an example, the province has comparative advantages in potash, uranium and dryland farming. Don't, therefore, try to grow oranges in Regina or start up a computer manufacturing industry, but "dance with the one that brung ya" and stay focused on potash, uranium and grain production.

5 http://www.answers.com/topic/diversification

6 *Ibid.*

Others argue that reliance on a small set of industries—especially natural resource industries[7]—exposes an economy to volatility and limits potential growth.[8] Hence, Saskatchewan has, for example, worked hard to develop its tech sector (witness the Canadian Light Source Synchrotron—www.lightsource.ca—at the University of Saskatoon) and its film industry. This does not require the abandonment of traditional sectors, *but rather the addition and growth of new ones*. However, "diversification could significantly slow economic growth at least in the short-term as resources are reallocated from established sectors to new sectors" (San 2006). This helps explain why there is reluctance to focus on diversification in Alberta where the oil and gas sector is such a major economic force; it does not make sense to undermine your economic engine even though you fear that a lack of diversification will be a problem down the road.

As San (2006) argues: "Specialisation and diversification are a dilemma for small economies. On the one hand, small economies that naturally possess a limited pool of resources tend to concentrate on a few types of production activity. To foster growth and development, they would heavily rely on imported resources and foreign markets, and as a result, are compelled to exhibit a high degree of openness or a large share of international trade in gross domestic product (GDP). International trade at the same time would promote specialisation in a few economic activities that enjoy comparative advantages in the world market as the Ricardian trade theory predicts. On the other hand, specialising in a small number of activities, or sectoral concentration, is widely believed to be risk prone and detrimental to macroeconomic stability. It could make the economy vulnerable to sector-specific shocks and being exposed to output volatility…. Specifically, any blow to one key sector could exert serious dampening effect on the economy. Diversification of activities is therefore argued to spread risk and provide new opportunities for growth and employment."

Even if diversification should not necessarily be seen as the Holy Grail of economic development, and even if it can cause economic losses in the short-term, it has the potential to smooth-out the disruptive boom-bust cycles of the West's natural resource sectors (and the sectors that rely on them), and it has the potential to grow the economy by adding economic output that can compete in the global economy. The trick is to avoid artificial diversification that supports industries that cannot compete in the global economy, but instead divert capital, labour, and research and development dollars from industries that can. Avoiding artificial diversification that cannot sustain itself in the market (notwithstanding some initial support to get it to this point) is of critical importance when seeking to expand the green economy in western Canada.

[7] The ups and downs of the US-Canada auto industry suggests that over-reliance is not just a problem in the natural resource sector.

[8] As the Edmonton Chamber of Commerce agues: "The … purpose is to sound a clarion call that living off the proceeds of raw materials and adding limited amounts of value adding processes is a prescription for economic and social decline. Economic Diversification is not an option—it is a necessity. More important than getting it right is getting it moving forward ever more confidently" (Wentzell 2010).

As Gibbins argues, "One thing is clear: the old model of economic development, moving from resource extraction to labour-intensive manufacturing, no longer works. The goal, therefore, is not to replicate the central Canadian economy of the late 20th century, but to build a new economy aligned with global change, one that reconciles resource wealth with the region's creative potential. Reconciliation is the key, for although neither model alone will work, they are not incompatible" (Gibbins 2011).

Green Diversification

It is important to note that greener does not always mean more diverse. For example, if a home builder offers customers green housing products such as designs that require less energy and building practices that produce less waste, this is clearly part of the green economy as we have defined it. If green home options catch on with consumers (or if they are foisted on them by government regulation), they will displace other home construction methods. The builders who adapt, and the new ones who join the green game, will thrive; those who don't will likely whither away.

In terms of diversification, however, this does not necessarily change anything. There was home construction before the green options and there is home construction after them. *Diversification* takes place if the green building industry in the West captures part of the home construction market in other jurisdictions or exports its expertise to home builders in other places.

For example, if a western Canadian green home builder starts building homes in Toronto or Seattle or China, this would contribute to the diversification of western Canada's economy. If a western Canadian green home builder simply displaces a non-green western Canadian home builder, there is more green economic activity (i.e., a greener economy), but no net change to the diversity of the regional economic base.

This example shows that green economic activity does not automatically translate into greater economic diversification. The green products and services must represent a unique addition to the industrial base or they must capture market space from competitors.

4. Measuring the Green Economy

"We are beginning one of history's great transitions, the transition to a new economic foundation for the 21st century and beyond, free of fossil fuels."

—Governor of California Arnold Schwarzenegger, November 16, 2010, Governor's Global Climate Summit at the University of California, Davis

Measuring the green economy is challenging for two reasons: First, you need to identify the *specific* products, services and processes directly related to improving environmental sustainability. This classification process involves making some arbitrary decisions. For example, should nuclear power plants be included since they release less greenhouse gas than coal-fired power plants? Some say yes. Others say no because they feel that other environmental impacts of the nuclear industry disqualify it. For better or worse, there is no "supreme court" of the green economy that can make a final decision. For now, it is up to individual researchers and statistical organizations to make these judgment calls.

Second, once you have a list of what is green, you need to either adapt existing, or create new, statistics so you can measure the economic contribution of each item on the list. The problem is that current measurement systems are not designed to account for green economic activity. For example, if energy efficient dishwashers make the list of green products, the North American Industry Classification System (NAICS) does not distinguish between regular dishwashers and energy efficient ones.[9] There are certification programs such as the US Environmental Protection Agency's "Energy Star" labeling initiative, but these do not provide macro level statistics suitable for measuring green activity across the economy.

Measuring the green economy gets even more tricky when production processes are brought into play. For example, if a book publisher starts using recycled paper and vegetable-based ink, it is arguably producing a green (or at least greener) product and, in turn, participating in the green economy. But how do we know this? A paperback is not a green product in and of itself, and in the absence of regular surveys that ask a representative sample of businesses about the greenness of their production processes, we have no consistent way of assessing how much green activity is taking place behind the scenes in the economy.

[9] The six-digit NAICS code "335223" is the most specific the NAICS gets and provides this information: "Dishwashers, household, electric, manufacturing."

Another level of complexity gets added when we try to link the green economy to economic diversification. In order to assess the impact of the green economy on diversification, we need to know not only if the activity is green, but also whether or not it is a new activity (i.e., industrial diversification) and/or an activity that is enriching the West's export markets (i.e., market diversification).[10] For example, if a western farmer starts producing organic canola, we need to decide if this is truly diversifying the industrial base. Given that canola is not a new product and agriculture is a traditional industry in western Canada, organic canola does not add something new to the region's industrial base. It does not, therefore, diversify the economy (though it may be a good idea for other reasons). However, if the organic version of canola allows the West to diversify its customer base, it contributes to market diversification. Unfortunately, extracting this sort of information from existing statistical databases across the full range of the economy is not possible.

The Green Economy in the United States

Recognizing the lack of data on the green economy, the US Department of Commerce set out to develop the first accounting of the green economy in the United States.

The Department of Commerce first defined green products or services as those whose predominant function serves to conserve energy and other natural resources or reduce pollution.[11] The next step was to identify green products and services on the list of over 22,000 product and service codes in the most recent Economic Census: "To take into account some of the disagreements regarding the 'greenness' of various products or services, we categorized products and services using both a narrow definition and a broad definition of green. The narrow definition includes only those products and services for which ESA [Economics and Statistics Administration] analysts assumed there was wide agreement regarding their classification as green. The broad measure includes products and services whose green status may be more open to debate. Using our more conservative,

[10] We are leaving aside here the idea of the erosion of diversity. This happens in two ways: 1) A sector of the economy increases its economic output more than other sectors and, thereby, decreases the relative importance of those sectors. For example, if the oil and gas sector in Alberta is having a really good year, its percentage of the province's GDP goes up and this is seen as reduced diversification as the economy is more dependent on that sector. 2) A sector decreases its economic output or dies out completely. In the latter case, if the greening of a sector prevents it from shrinking, it could be thought of as maintaining diversity even if the sector is not growing and even if the greening does not add anything truly new to the economic mix.

[11] US Department of Commerce 2010: "green products or services [are] those whose predominant function serves one or both of the following goals: Conserve Energy and Other Natural Resources: This includes products or services that conserve energy to reduce fossil fuel use and promote water, raw material, land, and species and ecosystem conservation; or Reduce Pollution: This includes products or services that provide clean energy or prevent, treat, reduce, control or measure environmental damage to air, water and soil. The remediation, abatement, removal, transportation, or storage of waste and contaminants also are considered to reduce pollution" (p. 5-6).

narrow definition, we identified 497 product and service codes as green. Using our broad definition, we identified 732 product and service codes as green" (US Department of Commerce 2010, p. 7).[12]

The analysts were then able to estimate the size of the green economy in the US. Using the narrow categorization of products and services, the size of the green economy was estimated to be $371 billion in 2007 or 1% of the total private business economy (the government sector is not part of the Economic Census). Using the broad definition, the size of the green economy rises to $516 billion or 2% of the economy. As the report notes, even under the broad definition, "the green share of the economy was relatively small" (US Department of Commerce 2010, p. 12).

What does this tell us about the size of the green economy in Canada? The US study suggests that, even given the many differences between the two economies, it is unlikely that the green economy in Canada represents more than a few percentage points of the overall Canadian economy. This does not mean that it is insignificant; if the green economy in Canada represents 2% of the overall economy, this translates into $32 billion of economic activity (using 2008 GDP as a baseline). If Canada's green economy turns out to be as large as 5% of the overall economy, it would be an $80 billion sector.

Given the results of the US study, the green economy in Canada is likely small relative to the economy as a whole. Proponents of a greener economy would, however, also point out that the green economy is in its early stages of growth and has the potential to become quite large. Nonetheless, the US study suggests that the ***current*** impact of the green economy on diversification, even if we were to assume that ***all*** green activity contributes to diversification, is also small. Green diversification has the ***potential*** to significantly increase the diversity of the West's economy, but it is not yet a transformative force. If the green economy is to become a larger component of the overall economy, and if it is to have a significant influence on the region's economic diversity, there will have to be large-scale changes to how the economy operates and to what it produces.

[12] The categorization process was fraught with difficulties: "For some products and services, it was difficult to discern the importance of certain green characteristics relative to the overall product or service. For example, the 'tire servicing' category includes activities that inflate and balance tires, which improve mileage and reduce energy use. However, since this is not the predominant purpose of tire servicing, ESA analysts did not classify tire servicing as green. Another example is bicycle production. While only a small portion of bicycles are used for commuting purposes, they were included as a green product because ESA analysts determined that on balance the use of bicycles is beneficial for reducing energy use. However, because the inclusion of bicycles as a green product could be debated, they were included in only the broad (not narrow) category of green products and services" (US Department of Commerce 2010, p. 7).

Other Estimates of the Size of the Green Economy

A Globe Foundation study of BC's green economy commissioned by the BC Government estimates that it contributed $15.3 billion to the province's GDP in 2008 or about 10.2% of BC's economy (Globe Foundation 2010a). In a report commissioned by Britain's Department for Business Enterprise and Regulatory Reform, the "low carbon and environmental goods and services economy" in the UK is estimated to be about 7% of the national economy (Innovas 2009).[13]

The BC and UK studies suggest that the US study is underestimating the size of the green economy, or that the green economy in the US is actually a smaller percentage of the total economy than in BC or the UK. Due to methodological differences between the studies, we cannot say which it is. If the higher estimates are indeed accurate, the current diversification effects of the green economy would be larger than suggested by the US study. However, it is important to remember that even if 10% of the economy is green, not all, or even most, of this activity will affect diversification. Erring on the side of a conservative estimate, one can assume that the current impact of the green economy on diversification is modest.

PUBLIC OPINION AND THE GREEN ECONOMY

In a recent survey commissioned by the Canada West Foundation,[14] western Canadians were asked two questions about green *energy* (though not the green economy in general). The first question asked if respondents supported paying higher energy prices to support green energy and the second asked if they would support using tax dollars to help industries development green energy such as wind power and solar power.

[13] The method used in the BC study involved identifying sectors of the provincial economy deemed to be part of the green economy using six-digit North American Industry Classification System codes. Canada Revenue Agency data was then obtained for those corporations operating in BC whose six-digit codes matched with the list of green sectors. Intensity ratios where applied and the CRA data was converted into GDP using Statistics Canada's Inter-Provincial Input-Output Model.

The UK study "includes activities undertaken by companies across the whole environmental supply chain, from R&D, through manufacturing into distribution, retail, installation and maintenance services. Companies are included in the supply chain where 20% of their turnover is supplied into the LCEGS sector, but importantly only the sales activity relating to this sector is included in this study.... The study uses 'bottom-up' data based on what companies actually do, rather than what they are classified as doing under the [Standard Industrial Classification] system. In doing so, it identifies and measures 2490 Environmental, Renewable Energy and Emerging Low Carbon activities within 23 sub-sectors.... This is a multi-staged process that uses multiple econometric techniques, sources and methods (such as data triangulation) to verify and enrich source data drawn from multiple sources. The approach uses data from actual, live and a reported numbers, based upon a rigorous assessment of the source data" (Innovas 2009 p 19-20).

[14] The survey field work was conducted by Environics Research Group Limited on behalf of the Canada West Foundation. The survey was conducted by telephone between November 24 and December 8, 2010. The results are based on a representative sample of 1,202 western Canadians (300 per province) 18 years and older. The results are accurate for the full sample +/-2.8 percentage points 19 times out of 20. Data are weighted by province, age and gender.

When it comes to paying more, we found that 24% strongly support this option and 45% somewhat support it. (The question did not indicate how much more respondents would have to pay.) This suggests that, at least in theory, a majority of western Canadians (69%) would support the expansion of green energy even if it meant paying more for it than conventional energy. When asked about using tax dollars to subsidize the development of green energy options, we found that 42% strongly support this and 40% somewhat support it for a total of 82% on the support side of the ledger.

These results suggest that green economic initiatives (in this case green energy), are seen in a favourable light by many western Canadians. This on its own will not further the development of the green economy or green diversification in the region, but it does show that the public is open—at least in theory—to change.

Do you strongly support, somewhat support, somewhat oppose or strongly oppose paying higher energy prices to support green energy in your province? (WESTERN SAMPLE N=1,202)

Strongly support	24%
Somewhat support	45%
Somewhat oppose	16%
Strongly oppose	12%
Don't know/depends	3%

Do you support or oppose using government tax dollars to help industries in your province to cover some of the costs of developing new sources of green energy, such as wind power and solar energy? (WESTERN SAMPLE N=1,202)

Strongly support	42%
Somewhat support	40%
Somewhat oppose	8%
Strongly oppose	8%
Don't know/depends	1%

Source: Environics Research Group Limited, special survey for the Canada West Foundation

A Way Forward

The measurement difficulties are a double whammy that renders meaningful estimates of the green economy's impact on diversification impossible at this time. What is needed is a coordinated effort involving Statistics Canada that will yield a working definition of green activities that is then applied to the Canadian economy at both the national and provincial level and across economic sectors. The resulting database should be updated annually. Once this is available, more work can be done to assess the effects of green activities on economic diversification itself. Until we have this sort of information, managing green economic diversification will be extremely difficult.

5. The Green Economy in Action

—"There's money to be made from investing in environmental stewardship."

Paul Marck, Editor, Alberta Venture Magazine, August 2010

There are many green businesses in the West and they come in a variety of shapes and sizes. In order to obtain a better understanding of green businesses operating in western Canada, we spoke to representatives from eight companies (two from each western province) about their green activities.[15] Although this information is not representative of western Canada's green economy as a whole, it provides insight into what kinds of companies are out there, what type of work they are doing, and what role public policy has (and could) play in their success.

Each company was asked to explain the type of work they are engaged in; discuss why they decided to start a green business; identify success factors; discuss the role of public policy has or has not played in their success; and recommend what government/public policy should be doing/not doing to facilitate the continued success of green companies.

[15] Survey participants were chosen randomly from a list of companies with a clear connection to the green economy. An effort was made to ensure representation from all four provinces. The information reported in this section should not be construed as offering financial advice on the financial viability of the companies that participated in the survey or investment advice of any kind.

INTERVIEW PARTICIPANTS

ALBERTA *Alberta Wind Energy Corporation*	Alberta Wind Energy Corporation is a wind power project developer.
BRITISH COLUMBIA *Ballard Power Systems Inc.*	Ballard Power Systems Inc. is a world leader in the development, manufacture, sale and servicing of clean energy hydrogen fuel cells.
ALBERTA *Boyd Solar Corp.*	Boyd Solar Corp. designs solar electric and solar heat systems.
MANITOBA *Elton Energy Cooperative*	Elton Energy Cooperative was formed in 2006 to investigate the potential for development of community-owned renewable energy sources.
SASKATCHEWAN *Greenfield Carbon Offsetters Inc.*	Greenfield Carbon Offsetters Inc. is a manufacturer, purchaser, and wholesaler of carbon credits. They do carbon sequestration through agro-forestry.
SASKATCHEWAN *Milligan Biotech Inc.*	Milligan Biotech Inc. is a Canadian bio-diesel production company with a strong emphasis on research and development.
MANITOBA *Nordevco Associates Ltd.*	Nordevco Associates Ltd. is a leader in providing biological solutions to a myriad of industries.
BRITISH COLUMBIA *Tantalus Systems Corp.*	Tantalus provides Smart Grid communications technology that enables electric, gas, and water utilities to optimize the use of resources by automating monitoring and control processes, improving operational efficiency, and delivering the information utilities consumers need to manage energy intelligently and cost-effectively.

Although these companies operate across the West, and therefore deal with different provincial and municipal political landscapes, and even though they work in a variety of subsectors, there was considerable agreement about the main challenges and opportunities facing green industries in western Canada.

Conducted in late 2010 and early 2011, the interviews came at a somewhat difficult time as companies had experienced several years of economic uncertainty due to the global economic recession. Despite the economic constraints, the interview participants were optimistic about the future of the industry as they see domestic interest growing in energy efficiency and conservation, continuous advances in green technology, and a potentially vast international market.

Challenges

While a general sense of optimism pervaded the discussions, interview participants identified a number of challenges that currently face the green industry in western Canada. Theses challenges include the hurdle of commercialization; a reluctant domestic market; and a fixation on large, capital-intensive energy solutions.

The hurdle of commercialization

Commercialization has long been a problem for Canadian companies and businesses and the green industry is no exception. The interviews indicate that moving from the technology development and implementation stage to commercial marketing is a significant hurdle.

The challenge of commercialization is a significant one for western Canada. In an international marketplace, the longer it takes a company to reach commercialization capacity, the greater the possibility that they will be too late. The CEO of Tantalus observed that it is taking American and Chinese entrepreneurs less time to get from idea conception to critical mass than it takes Canadian entrepreneurs. He noted, "from the day that a guy like me has an idea to the point where it is a viable business that can grow on its own, Canadians are taking much longer than some of our largest competitors."

This time lag is disadvantaging Canadian entrepreneurs and companies in the international market. It also means that if Canadian companies are to be competitive in the global marketplace, there needs to be greater awareness about why commercialization is taking so much longer for Canadian entrepreneurs and what can be done to expedite the process.

The answer to why it is taking Canadian companies longer to commercialize their innovations is a complex one. In general, successful commercialization requires the effective coordination of product marketing and development, commercial management, and financing. To help more companies develop and market their products, interview participants would like to see increased access to financial capital—either through government programs or tax incentives—become a public policy priority.

Without capital it is exceedingly difficult for companies to grow their organizations and hire the skilled personnel required to facilitate that growth. The majority of companies we spoke to indicated that this has been a significant challenge for them and spoke about what strategies they employed in order to overcome the challenges around access to capital.

Milligan Bio-tech indicated that they operated without any revenue for several years as they concentrated on developing their technology and refining their processes. Ballard Power Systems was able to leverage their years of research and development expertise to shift their focus away from a primarily research emphasis to a marketing and commercial focus. Tantalus indicated that they relied on the already established engineering component of their business to subsidize their green developments until they were able to generate revenue on their own.

This suggests that in lieu of government support or angel investors for green companies, there must be either alternative sources of income for developing green businesses or enough of a financial cushion to absorb the cost of development. Without these kinds of income it is difficult for companies to survive and overcome the challenges of commercialization, particularly when they are developing new technologies.

A reluctant domestic market

Another challenge highlighted by green companies is that there is a general reluctance in the domestic market to adopt and incorporate homegrown green innovations and technologies, particularly on the part of Canadian companies. According to those interviewed, this is the result of a cultural mindset that discounts local solutions, policies that favour international producers, and risk-adverse governments and businesses.

A cultural resistance to local solutions is both difficult to quantify and difficult to overcome. Yet, according to the companies we spoke with, it is a challenging problem. Tantalus' CEO notes about his company, "almost all of my customers are outside of Canada and that's because we are Canadian. When you are a Canadian company and you go into a commercial pursuit, you are at a disadvantage in Canada. Canadians don't like to buy from Canadian companies."

Additionally, there is the challenge of policies that put Canadian producers at a disadvantage. For example, Milligan Biotech noted that one of their challenges is that Canada continues to import biodiesel from the heavily subsidized biodiesel industry in the US. As a result of subsidization, American producers are able to provide biodiesel at a lower rate than Canadian producers, which thereby places Canadian producers at a disadvantage.

A final element of this challenge is the risk-adverse culture of Canadian businesses and government. This means that businesses and governments are hesitant to adopt new technologies that may not have been tested yet in the mass market. To be clear, risk-adverse sounds like a very negative attribute, but it is important to remember that many green innovations are essentially disruptive technologies, which poses unique challenges for both governments and individual companies and consumers.

Take government as an example: although it may be desirable for governments to use more sustainable technologies in their transportation and energy consumption, they also have a responsibility to ensure that public money is spent wisely. This inherent conservatism in government poses a limit on the extent to which they can adopt and experiment with emerging technologies.

With many of the new technologies there is an infrastructure and implementation problem. An example of this can be found in the biodiesel industry. Some provincial governments and the federal government are interested in moving toward increased use of biodiesel technology in their transport fleets. The problem, however, is that currently the infrastructure is not in place to support that kind of technological change. The question becomes: what should come first, the infrastructure or the demand?

Even in the private sector there are problems associated with adopting new technologies. Many of these technological innovations are only available at a high cost and they have often not yet been tested at a mass level. Companies therefore are taking a significant risk in being early adopters and they have little incentive to do so. One solution, then, is that governments could provide incentives to companies to adopt and market test new technologies. This would not only help green businesses to overcome the hurdle of commercialization, but would enable a testing ground for new technologies.

With regard to the role of government support through the adoption phase, one interview participant observed, "the fuel cell sector is a disruptive technology; it is changing the way that businesses solve problems. Like most disruptive technologies, if government can provide support through the initial market adoption phase, that can go a long way to getting traction in the market place and then there comes a time where it takes off on its own."

The result of a reluctant domestic market, either for cultural, economic or political reasons, is a heavy reliance on the export market. Regardless of the explanation, the reality is that currently the success of western Canadian green businesses is tied to the international export market.

This reluctance in the Canadian market has resulted in a situation such that if Canadian green companies cannot enter the international market where there are greater economies of scale and where the mandates of other political jurisdictions are greener, they are unlikely to succeed.

Fixation on large capital-intensive energy solutions

An additional challenge identified by green companies was that there is something of a fixation in Canada on large, capital-intensive energy solutions. This has been the traditional model for energy systems in Canada and there is a tendency in government and on the part of traditional producers to focus only on these kinds of solutions. By contrast, many of the new technologies being developed by green companies focus on localized, more responsive energy systems.

Large energy projects are often an easy sell as they are simple to explain and the technology is familiar. As such, it is relatively straightforward to get federal and provincial support for the projects. By comparison, many of the emerging green technologies are unfamiliar, may still be in the development phase, and are problematic for a risk-adverse bureaucratic system.

According to interview participants, the problem with the emphasis on large capital energy projects is that they are extremely labour intensive, have centralized ownership and control, and they represent a fixed capital cost in a variable market place.

Labour intensity can be either a good or a bad thing, depending on how you look at it. On the one hand, these kinds of projects provide jobs and serve to stimulate the economy. An example of this can be seen in the development of the Alberta oil sands, which employs thousands of people as the sites are developed and constructed. On the other hand, the problem with these types of projects is that they create most of their jobs when they are in the building phase, not in the operations phase, which means that the economic impact is not sustainable and consistent. Second, because western Canada does not have a surplus of people, the labour costs of these types of projects quickly become inflated, which places us at a disadvantage compared to countries like China and India where cheap labour enables them to build similar projects faster and cheaper.

The issue of having fixed capital costs in a variable market place is an interesting one as well. Green companies forecast that in the future energy will need to be more intelligent, more responsive, and more sustainable. This will enable us to use our resources more efficiently and will overcome some of the barriers currently faced in the distribution and transportation network systems.

For example, the respondents with Nordevco Associates Ltd. noted that any fixed capital solution can be risky for smaller producers because if the market expands, they may find themselves with insufficient capacity to meet demand, and if the market shrinks, they may have already invested too much. The fundamental problem, then, with any fixed capital solution is that it is not nimble enough to respond to fluctuating market trends. As such, these investments can easily result in a negative rather than a positive return.

Representatives from Ballard Power Systems agree: "one of the things that has to happen is that we have to start to work toward more localized sources of power and move away from large-scale, centralized plants that produce power with these large distributive networks to distribute the power to vast distances. We need to move to a more nimble approach to putting power where it is needed and ideally making it green wherever you can."

Elton Energy Cooperative is working on a model of community-owned power investments that would enable rural communities to develop and invest in renewable power generation for their municipality that would offset some of their fixed energy costs. One of the main challenges in bringing this model to fruition is that governments do not know what to do with alternative energy models. As a respondent from Elton Energy observed, "right now there are no tools and no definitions; so defining what community energy is, what that means, and what those projects should look like is a problem. There is no policy right now." This adherence to large, centralized energy projects limits the conversation and the development of green energy solutions in western Canada.

The main challenges identified by companies, then, include the hurdle of commercialization, a reluctant domestic market, and a fixation on large, capital-intensive energy solutions. These challenges are significant and in many respects interconnected. It is important to identify the challenges currently facing green businesses so that public policy recommendations can be weighed against them. If there is not sufficient awareness of the types of issues green businesses are facing, then there is no standard upon which to judge potential policy solutions.

Opportunities

While there are many challenges facing western Canada's green businesses, the people we spoke with were optimistic about the future. They felt as though there were many opportunities for expansion and growth within their industry, both locally and internationally.

Company representatives felt that the Canadian green economy sector is poised for growth for three reasons. The first is that there is a growing awareness of the importance of environmental conservation in the developed world. Second, as a result of this increasing awareness, more and more individuals and businesses are investing in green technology development and implementation. Finally, there is a growing demand for energy that is flexible and localized in the developing world. These three factors are encouraging growth and development in the green economy and are likely to continue.

A changing cultural consciousness has an impact on both businesses and governments with regard to their energy consumption patterns. There is pressure on businesses to model and support sustainable energy consumption and many major corporations are striving to "green up" their operations. This is done through increased reliance on renewable energy sources, building according to green energy standards, and supporting organizations that are involved in environmental conservation.

There is similar pressure placed on governments to not only improve their environmental footprint but also to modify their standards and regulations to incent environmental stewardship. For example, one respondent argued that governments should be doing more to support green technology implementation by changing the way they look at energy. Rather than treating renewable energy sources like solar panels and wind turbines as a taxable addition to homes and business (and thereby punishing those who implement them), green technology users should be rewarded for the infrastructure and distribution costs that they have saved the government.

Perhaps the most interesting opportunity for the green economy is the reality of increased energy demand in some of the world's emerging economic powers. "Countries like India, China, and those in the Americas, they don't have the same infrastructure and they aren't going to start off without an integrated model. They aren't going to build massive coal-fired plants because they don't have the transportation infrastructure, instead, they will start with grassroots infrastructure, renewables and micro-grades," noted one interview participant. This represents a massive market for green technology companies, and if western Canadian companies can be at the forefront of providing innovative and adaptable energy solutions to the billions of people living in these developing countries, there is no accounting for how significant the green economy could become.

Role of Government

One of the challenges facing green companies in western Canada is operating within jurisdictions with politically inconsistent environmental mandates. We spoke to companies from across the region and although some of them indicated that they had received significant support from local, provincial and federal governments, they also indicated that support has tended to be more verbal than substantive.

There was disagreement about what the role of government should be in promoting green technologies and supporting the green economy sector. Ideology appeared to play a large role and those who are more libertarian in their outlook believe that governments should not be artificially propping up the industry as that will discourage effective business practices and create an insupportable economic base. Others believe that because of the disruptive nature of the new technology, the costs associated with implementation, and the environmental imperative, governments should be assisting companies until they are able to be self-sufficient.

This second position was the view of a participant from Alberta Wind Power Corp. who stated, "until renewable electricity generators are paid full value for their clean electricity, which includes the value of being carbon neutral, government will need to continue to provide support for the industry in one form or another."

Those who believe government has a role in supporting the development of the green economy provided several broad recommendations, such as having a clear energy strategy at the provincial and federal levels and following through on the mandates proposed therein that could be beneficial for the industry. Both Ontario and BC are examples of jurisdictions that have taken a strong stance on energy use and environmental considerations and are putting actions behind their words (see below for an overview of Ontario and BC's green energy policies).

Additionally, there were a number of specific policy recommendations put forward that some participants thought would assist the development and growth of the green economy. These included a feed-in tariff, Renewable Portfolio Standards (RPS) strategies, and increased funding support for organizations that are assisting companies to develop ideas and push them toward commercialization.

Feed-in Tariff: A feed-in tariff is a policy mechanism that is designed to encourage the adoption of renewable energy sources to accelerate grid parity. This policy mechanism generally includes three provisions: guaranteed grid access, long-term contracts for the electricity produced, and purchase prices that are based on the cost of renewable energy generation. Under this tariff, the obligation is imposed on regional or national utilities to buy renewable electricity from all eligible participants. Currently, Ontario is the only jurisdiction in Canada to have adopted a feed-in tariff, which includes a tariff schedule for both large (greater than 10 MW) and small projects.

As of 2009, feed-in tariffs have been enacted in 63 jurisdictions around the world. In 2008, following a detailed analysis, the European Commission concluded that "well-adapted feed-in tariff regimes are generally the most efficient and effective support schemes for promoting renewable electricity."[16]

Renewable Portfolio Standards Strategy: A RPS strategy is a regulation that requires increased production of energy from renewable energy sources such as wind, solar, biomass and geothermal. Certified renewable energy generators earn certificates for every unit of electricity they produce and can sell these along with their electricity to supply companies. Because this is a market mandate, the RPS relies upon the private market for implementation. Unlike feed-in tariffs, these programs tend to allow more price competition through eligibility and multipliers. RPS-type mechanisms have been adopted in several countries and in 30 US states.

Venture Capital: A final recommendation was that the government should provide financial support to help get green products to the commercialization stage. The companies interviewed indicated that government support makes a substantial difference to the success of green businesses as they transition from product development to commercial marketing.

It is important to remember that this is a list of policy recommendations that emerged during these conversations. As such, not all of these recommendations are supported by all of the companies interviewed and may not be representative of the industry as a whole. They are intended to be instructive and exemplary about the policy supports some companies have proposed.

[16] European Commission (COM). 2008. Commission Staff Working Document, Brussels, 57. 23 January 2008. Accessed Dec 2, 2010 at http://ec.europa.eu/energy/climate_actions/doc/2008_res_working_document_en.pdf

GREEN ENERGY POLICIES IN ONTARIO AND BRITISH COLUMBIA

Ontario

Ontario's Green Energy Act was passed in May 2009. This Act built off of the province's earlier climate change action plan, entitled *Go Green: Ontario's Action Plan on Climate Change*, and was designed to build on earlier initiatives on the province's power supply, including a plan to eliminate coal-fired power by 2014.

The *Green Energy and Green Economy Act* (GEA), in cooperation with other complimentary policies and regulations, provides the government with the necessary tools to create a culture of conservation and assists homeowners, government, schools and industry in embracing lower energy use.

Key elements of this legislation include: streamlined approvals for renewable energy products; mandatory home energy audits prior to the sale of homes; developing a feed-in tariff system to provide guaranteed prices for renewable energy projects; opportunities for municipalities and Aboriginal communities to build, own and operate renewable energy projects; and the establishment of an academic research chair to examine potential public health effects of renewable energy projects.

Under Ontario Power Authority's Feed-in Tariff Program (FFT), Ontario energy consumers are able to participate in micro-generation by selling power derived from renewable sources (solar, wind, water and bio-energy) back to the grid for guaranteed, subsidized rates. As of April 2010, the FIT program has incented 2,500 MW of small-scale projects from 184 separate agreements.

British Columbia

British Columbia passed their *Clean Energy Act* in April 2010. This Act sets the foundation for a future of electricity self-sufficiency, reduced greenhouse gas emissions, and investments in renewable energy. This Act works in conjunction with, and builds upon, several other policies including the *BC Energy Plan* and the *BC Bioenergy Strategy*.

This act advances 16 energy objectives by expediting clean energy investments, protecting BC ratepayers, ensuring competitive rates, encouraging conservation, strengthening environmental protection, and aggressively promoting regional job creation and involvement of First Nations.

The *Clean Energy Act* sets the foundation for three areas of priority. The first is ensuring electricity self-sufficiency at low rates by establishing a new regulatory framework, a commitment to renewable electricity generation, and measures to promote electricity efficiency and conservation. Second, harnessing BC's clean power potential to create jobs

in every region. This will involve providing BC Hydro and renewable power producers with the necessary tools to enable economic growth and job creation throughout the province. Third, strengthening environmental stewardship and reducing greenhouse gases by improving the Environmental Assessment Act process and prohibiting the development or proposal of energy projects in parks and protected areas.[17]

Summary

According to the people we spoke with, there are many challenges facing green businesses—challenges that are detrimentally impacting their ability to grow and market their innovations both in Canada and around the world. Despite the challenges, these companies remain confident and optimistic about the future. They see that there is an increasing role for diversified energy production and for increased efficiency and sustainable business practices in the way that energy is produced, distributed and consumed.

The role for government here is something of a balancing act. According to the people we spoke with, there is a role for government in creating a positive framework around which green businesses can develop and flourish. This includes supporting funding agencies, being responsive to technological innovations, building policy frameworks that can accommodate new energy models, and helping green businesses to overcome the barriers currently in their pathway.

At the same time, though, governments should not be too involved. It is unhelpful, for example, if green entrepreneurs are forced to spend a disproportionate amount of their time navigating the bureaucratic procedures of government support, or, for governments to artificially prop up green businesses simply for the sake of appearances. The balance needs to be found wherein governments can provide support—both financially and in terms of policy—to companies with a strong business model that will enable them to transition more quickly from the innovation and development stages to commercialization.

Overall, the interviews show that green businesses face many of the same challenges as other new ventures: finding the necessary capital, achieving commercialization, and fighting what some see as the overly cautious mindset of the Canadian business community. There is a desire for government support coupled with the desire for government to stay out of the way. Additional challenges lie in the costs of transforming domestic and US fossil fuel infrastructure into green energy infrastructure. However, the interest in, and potential demand for, such a switchover bode well for green energy companies.

[17] Centre for Energy. *Facts and Statistics*. Accessed December 12, 2010 at http://www.centreforenergy.com/FactsStats/

6. Conclusion

This exploratory paper has unearthed three key things about the green economy and how it relates to diversification of the western Canadian economy.

Technical Difficulties

The first is that debate about the green economy is ahead of the empirical information needed to inform it. As with many new concepts (and many longstanding ones as well), there is no standard definition of the green economy. There are a number of useful definitions in the literature, but the variances are such that different definitions will yield different estimates of the size and scope of the green economy.

The technical problems get worse when you try to combine the idea of green economic activity with the idea of economic diversification. Both concepts are hard to measure in isolation and this problem only gets harder when attempting to determine if green economic activity is also increasing regional economic diversification.

The current independent definitional projects are a good start, but what is really needed is a coordinated and consultative effort that generates a standard and widely accepted definition of what is green and what is not. (To this end, the work of ECO Canada is exemplary, but the involvement of Statistics Canada is needed to generate quality statistics on a regular basis—see ECO Canada 2010.) Ideally, a Canadian definition will be compatible with an international definition that can be used to compare the green economies of different countries. Even if these exercises are successful, the link to economic diversification will likely remain at least somewhat fuzzy due to the inherent difficulty of accurately measuring the specific effects of green activity on economic diversity. A more accurate set of measures and statistics for the green economy would, however, do much to reduce the empirical uncertainty and allow for relatively more accurate estimates of the green economy's effects on diversification.

Despite these limitations, it is clear that the green economy is an important concept in the contemporary debate about economic growth and international competitiveness and that, fuzzy or not, it has the potential to increase economic diversification in western Canada.

Size of the Green Economy

As noted, a number of groups have developed working definitions of the green economy and generated estimates of its size *vis-à-vis* the overall economy. The US Department of Commerce estimates that the green economy in the US represented between 1% to 2% of the private business economy in 2007 (US Department of Commerce 2010). This translates into between $371 billion and $516 billion of private sector shipments/receipts in 2007. A British study estimates that the low carbon and environmental goods and services sector in the UK was worth 107 billion pounds or about 7% of the economy (Innovas 2009). According to a study of the BC economy, the green economy accounted for $15.3 billion of provincial GDP (10.2%) in 2008 (Globe Foundation 2010a).

Different definitions and methods mean that we cannot compare these statistics to each other (i.e., we do not know if the differences indicate real differences across these three economies or simply the outcome of using different definitions and methods). They yield, however, a size range for the green economy of between 1% and 10% of the overall economy. As noted above, it is not possible to say how much of this also involves diversification, but it is safe to assume that it is only a portion since not all green activity adds new customers or industries to the economy. If the actual total is nearer the low end of the range than the high end, the current impact of the green economy on diversification is small (though not insignificant). The bigger question, and one that is not possible to answer at this time, is what is the potential for growth in the green economy and, in turn, for it to advance the cause of diversification in western Canada?

Encouraging the Green Economy

We also learned from a small but pithy set of interviews with western Canadian businesses active in the green economy that there is significant entrepreneurial spirit being committed to growing green enterprises. It is these sorts of new ventures that are most likely to contribute to diversification as opposed to the "greening" of existing production methods and products.

As an emerging sector, the green economy in western Canada faces a variety of challenges including a lack of venture capital and the difficulties associated with getting to the commercialization stage of product development. There are opportunities for public policy to take a proactive role, but the degree to which it should intervene is ultimately a political question embedded in the broader debate about government intervention in the economy. One thing is clear, if the green economy in western Canada is to "take off," more venture capital will have to be found in either the private sector or in the form of government support.

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Appendix: Examples of Green Economy Industries and Jobs

US Department of Commerce

The US Department of Commerce categorizes green products and services by five types of green activity: pollution control; renewable/alternative energy; energy conservation; resource conservation; and environmental assessment. Table 1 in US Department of Commerce 2010 provides the following list of examples of green products and services included under these five categories:

Pollution Control

- nonhazardous and hazardous waste collection, disposal, remediation and engineering services
- waste transportation
- water treatment and engineering services
- muffler/exhaust repair
- organic foods
- phosphate-free laundry detergent
- air and water filters and purification equipment
- nuclear radiation detection and monitoring equipment

Renewable/Alternative Energy

- utilities, including engineering services—hydroelectric, solar, wind, geothermal, and cogeneration electricity generation, nuclear energy electricity generation
- biofuels
- waste energy generation services photovoltaics and solar heat collectors

Energy Conservation

- mass transit services and equipment including engineering services
- alternative fuel vehicles and hybrids
- green building construction
- energy efficient appliances
- insulation materials
- automatic environmental controls
- bicycles
- ground and groundwater source heat pumps

Resource Conservation

→ recycled, used, rebuilt or metal scarp products
→ particle board and medium density fiberboard
→ nature parks
→ botanical gardens and zoos

Environmental Assessment

→ environmental engineering, consulting and law services
→ environmental testing laboratories
→ environmental, conservation and wildlife organizations
→ regulatory safety inspections/emission testing for road vehicles

United Kingdom

A study commissioned by the UK government (Innovas 2009) defines a Low Carbon and Environmental Goods and Services sector for the UK that includes three "Level 1" categories: Environmental Activities; Renewable Energy Activities; and Emerging Low Carbon Activities. These categories are split into 23 "Level 2" categories as follows:

Environmental

→ air pollution control
→ environmental consultancy
→ environmental monitoring
→ marine pollution control
→ noise and vibration
→ contaminated land remediation
→ waste management
→ water supply and wastewater treatment
→ recovery and recycling

Renewable Energy

→ hydro
→ wave and tidal
→ biomass
→ wind
→ geothermal
→ solar PV
→ renewable consulting

Emerging Low Carbon

→ alternative fuels
→ alternative fuels for vehicles
→ additional energy sources
→ carbon capture and storage
→ carbon finance
→ energy management
→ building technologies

These categories are then broken down into 95 "Level 3" sectors and 2,490 discrete products and services at "Level 5."

British Columbia

In a study commissioned by the government of BC (Globe Foundation 2010a), the following sectors and sub-sectors of BC's green economy are identified:

Clean and Alternative Energy

→ renewable energy
→ bioenergy
→ hydrogen and fuel cells

Energy Management and Efficiency

→ energy management and power electronics
→ energy saving lighting and HVAC
→ advanced batteries, energy storage and charging systems
→ engines, power saving automotive equipment and hybrid technology

Green Building

→ architecture, community design and green infrastructure
→ construction and building materials
→ sustainable development, property management and real estate

Environmental Protection

→ pollution mitigation, control and remediation
→ waste management, reduction and recycling
→ water conservation and technologies
→ carbon capture, storage and sequestration
→ environmental consulting

Carbon Finance and Investment

→ carbon finance and offsets
→ investment and venture capital

Knowledge

→ education and training
→ research and development
→ information and communication technology
→ legal and accounting
→ public administration and support organizations

In a report prepared by ECO Canada (2010), the following example of green jobs are presented:

→ sustainability consultant
→ mechanical engineer
→ sustainability manager
→ sustainable packing teams
→ manager of sustainable seafood
→ energy manager
→ forester
→ solar panel consultant
→ biologist
→ environmental scientist
→ engineers in site remediation
→ facilities planner
→ economist
→ technician (e.g., wind, solar, environmental)

These jobs illustrate how difficult it would be to decide which elements of the green economy contribute to diversification as many of them can be found within traditional businesses and industries.

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