Launching Cleantech:

Ensuring Canada's Place in the New Global Market

Final Report of the Action Canada Task Force on Clean Technology

ACTION CANADA

Action Canada is Canada's leading public policy fellowship. Fellows are chosen from all sectors, including business, science, government, academia, and the professions. The program revolves around working conferences held across Canada, during which Fellows interact with leaders from government, industry, the media, academia, and NGOs. In addition, Fellows work in teams on policy projects that have, in past years, inspired Canadian public policy.

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Acknowledgements

We are grateful to the many individuals who generously gave their time to provide us with their knowledge and expertise on this topic, and to those who provide comments and suggestions on earlier drafts of this report. The group is especially indebted to Tom Rand, Celine Bak, Velma McColl, Alex Wood and Mel Cappe for their guidance. We would also like to thank the participants of our public dialogue on this issue, held in Winnipeg, Manitoba on November 4th, 2011. Finally, we would like to thank our Task Force advisor, Antonia Maioni, as well as the Directors, partners, and staff of Action Canada for enabling us to investigate this important topic.

This project has been undertaken pursuant to an Action Canada fellowship. Action Canada is Canada's leading public policy fellowship. Fellows are chosen from all sectors, including business, science, government, academia, and the professions. The program revolves around working conferences held across Canada, during which Fellows interact with leaders from government, industry, the media, academia, and NGOs. In addition, Fellows work in teams on policy projects that have, in past years, inspired Canadian public policy.

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Executive Summary

The rising cost of energy and resources, worldwide policy action to fight climate change and the transition to a low-carbon economy are causing a paradigm shift in the global economy.

This shift will profoundly affect the roots of Canada's prosperity, but it will also create vast new markets for clean technologies that promise increased performance, lower costs and fewer negative environmental impacts. The global cleantech market is currently a $1 trillion opportunity, expected to reach $3 trillion by 2020.

Many of our country's international competitors have moved aggressively to embrace the cleantech opportunity. Canada has a vibrant and growing clean technology sector, but we currently lack the policy framework needed to reach our full potential. We cannot afford to miss this opportunity: if Canada can capture just 2% of the global clean technology market by 2020, our domestic cleantech sector will be worth over $60 billion. This report makes three key policy recommendations to move us towards that goal.

Building domestic demand: Domestic cleantech adoption is essential for piloting new innovations and is a key enabler of export success. Canada currently underperforms in this area, whereas our competitors are skilled at using public procurement as a growth incubator for innovation. Canada's public procurement regime for cleantech should be aggressively expanded.

Providing export credit: Our cleantech companies are overwhelmingly export-oriented, but are often prevented from entering markets because prospective buyers cannot easily access financing. This financing gap could be closed through targeted financial products, the provision of limited sovereign guarantees, and greater collaboration between Export Development Canada (EDC) and development finance institutions. All of this would be bolstered through targeted, high-level cleantech promotion in key export markets.

Unlocking private finance & investment: Vast pools of private capital could be unlocked and channelled to the cleantech sector through targeted policymaking. Government could create specialized vehicles for cleantech infrastructure investment to attract long-term institutional investors seeking predictable stability. Our cleantech sector would also benefit from a strong, mandated enabling institution that could help reduce uncertainty and risk, incentivize the flow of often-scarce early-stage risk capital, and serve as a centre of expertise. An expanded and permanent Sustainable Development Technology Canada (SDTC) with stable funding would be a natural choice for this role.

Canada's economic strategy must address tomorrow's energy and climate realities. Our cleantech industry contains the seeds of our future prosperity; we must now summon the vision and leadership to win the markets of the future.

Securing Prosperity in an Uncertain Future

Over the coming decades, Canada and the world will face major energy, climate and resource challenges that will drive fundamental changes in the global economy and test the foundations of our collective prosperity.

The first challenge is the rising cost of energy and resources. Canada came of age amidst the gradual and consistent decrease in energy, food and commodity prices that defined the 20th century. This trend has come to an end, however: since the turn of the century, resource prices have spiked so dramatically and universally as to erase one hundred years of gains.[1] This is due in large part to surging prosperity in emerging markets, which are projected to add a further three billion people to the global middle class by 2030.[2]

The second challenge is our carbon-intensive global energy system. Climate change is an unequivocal threat to our collective prosperity and security. Preventing catastrophic damage to the climate – and the Earth's ability to sustain the human population – will require a major long-term de-carbonisation of global energy sources.[3] Governments worldwide have begun enacting policies to mitigate and adapt to climate change, a trend that will only intensify as the impacts of climactic disruption become increasingly pronounced.

Global policy responses to the climate challenge and the realities of rising energy and resource costs will create vast new markets. Future prosperity will flow to companies and economies adept at finding innovative solutions to these problems and exporting them to the world. This is the domain of clean technology or "cleantech", which broadly encompasses products, services or processes that provide better performance at lower costs, reduce negative ecological impacts, and improve the productive and responsible use of natural resources.[4] The cleantech sector saw year-on-year growth of nearly 30% over most of the last decade, and remained robust despite the global financial crisis.[5] The global demand for clean technology has exploded: cleantech was a $1 trillion global market in 2010 and is estimated to grow to $3 trillion by 2020, making it the third largest economic sector in the world.[6] Canada's current share of the global cleantech opportunity is $9 billion, or just under one percent of the market.[7] If we can increase our market share by even a single percentage point and maintain that position, Canada's cleantech sector will be worth $60 billion by 2020.

> *It is not an exaggeration to claim that the future of human prosperity depends on how successfully we tackle the two central energy challenges facing us today: securing the supply of reliable and affordable energy; and effecting a rapid transformation to a low-carbon, efficient and environmentally benign system of energy supply.*
>
> International Energy Agency,
> World Energy Outlook 2008

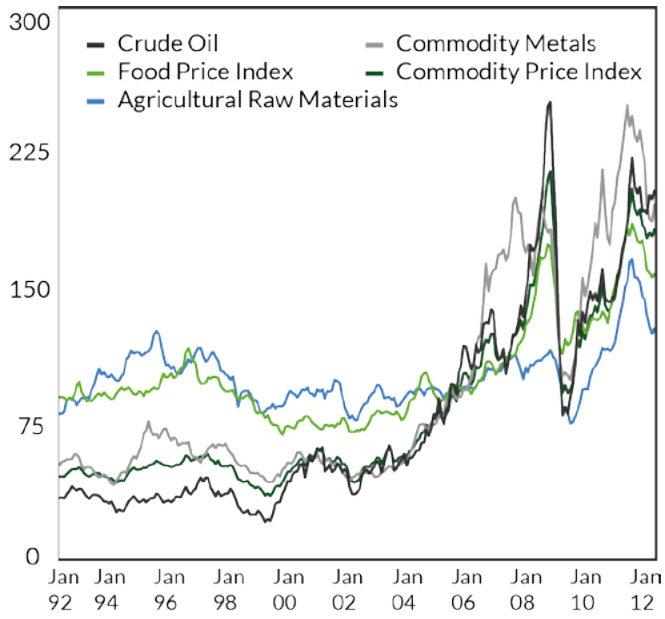
Building a low carbon economy creates the biggest market in human history, involving trillions of dollars. The question facing Canada is how we ensure we're a seller, not a buyer, in that market.

Tom Rand, Cleantech Advisor, MaRS

While this task may sound daunting, Canada has already achieved a similar rise to prominence in an innovation-intensive sector.[8] In 1990, the Canadian aerospace industry was approximately the same size as the Canadian cleantech industry today. Twenty years later, Canada is home to the fifth largest aerospace industry in the world, holds 6% of global market share and earns $23 billion per year from the sector. Our small size is not an impediment to capturing large global wealth creation opportunities.

At present, Canada is putting policy and political energy into a largely "business as usual" stance on energy and climate issues. Our economic trajectory has become increasingly dominated by petroleum and mineral extraction:[9] in the decade from 2001-2011, investments in energy and mining jumped from $40 billion to more than $86 billion and now represent 45% of all Canadian business investment.[10] Canada has enjoyed the economic benefits of this boom, but it has also begun to experience the economic distortions that accompany large natural resource endowments.[11] While Canada will remain an oil and mineral exporter in years to come, we must prepare our economy for what lies on the horizon. The 'Jenkins Report' recently confirmed that an economy built on technological innovations cleantech is one of the few sound, sustainable sources of long-term competitive advantage.[12] Canada's economic strategy must address tomorrow's energy and climate realities if we are to win the markets of the future.

World Commodity Prices, 1992 to 2012



Source: Index Mundi, http://www.indexmundi.com/commodities/

Canada's Cleantech Potential

Canada's skilled workforce, innovation clusters, research excellence and stable investment climate make it an ideal growth environment for cleantech firms.

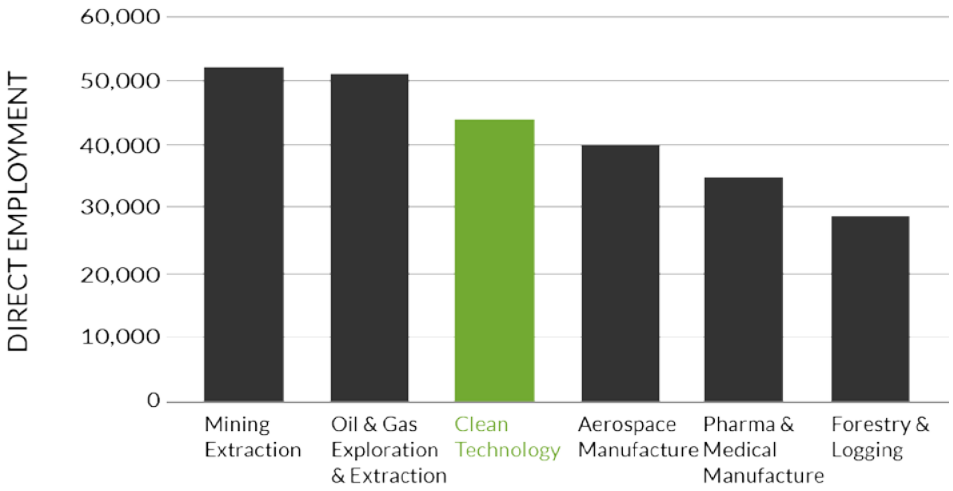
Canada is already home to over 700 cleantech companies, the majority of which are small and medium-sized enterprises (SMEs).[13] Cleantech firms are major drivers of innovation, investing nearly $2 billion in R&D between 2008 and 2010 alone. Cleantech activity is well distributed throughout Canada, tracking closely to population. Our four most populous provinces – Ontario, British Columbia, Quebec and Alberta – are home to 85% of the Canadian population and 88% of the Canadian cleantech market.[14]

Cleantech is a growing source of employment for skilled Canadians. In 2010, the sector employed approximately 44,000 Canadians, with the average firm counting approximately 60 employees.[15] Employment in the cleantech sector grew 11% annually between 2008 and 2010. If Canada simply maintains its current share of the global market, the sector is projected to employ over 125,000 people by 2020.[16]

Finally, the Canadian clean technology industry is globally competitive and overwhelmingly export-driven. Over 80% of Canada's cleantech SMEs are exporters, and are nine times more likely to export than similarly sized SMEs in other sectors. In 2009, over half of all Canadian cleantech revenue was derived from exports.[17] The United States is a large destination for our cleantech innovations, but importantly over 44% of export sales were derived from other markets, predominantly Europe and Asia.[18]

This unique combination of factors provides the foundation for Canada to become a powerful global cleantech competitor.

Employment in Canada, Selected Industries



Source: Analytica Advisors, Spotlight on Cleantech No. 1 (Ottawa, November 2011), www.analytica-advisors.com

International Competition

Many of Canada's international competitors have already understood the potential of clean technology and low-carbon innovation, and have made bold strides to capture this market.

China has emerged as a giant in the sector, targeting clean energy, energy conservation, and clean energy vehicles as key investment areas in its 12th Five-Year plan.[19]

The United States is home to the most vibrant cleantech venture capital community in the world. In his 2012 State of the Union Address, President Obama spoke of how the U.S. government's partnership with the private sector has positioned America to be the world's leading manufacturer of high-tech batteries and pledged to "double-down on a clean energy industry that never has been more promising".[20]

The UK established the world's first Green Investment Bank, capitalized with £3 billion and working to provide financial solutions that will accelerate private sector investment in the green economy.[21]

Australia recently announced the creation of an AUD $10 billion Clean Energy Finance Corporation designed to finance to renewable energy, energy efficiency and low emissions technologies.[22]

Canada's National Round Table on the Environment and the Economy (NRTEE) ranked Canada sixth in the G8 on its low-carbon performance index, due largely to our high-carbon economy and the weak performance of our low-carbon policy and institutions.[23] But it is precisely our economic reliance on its high-carbon exports that gives Canada our leadership potential in cleantech. Canada cannot afford to become a passive player in a world economy where the focus is increasingly on low-carbon and energy efficiency.[24]

Policy Recommendations

Despite our enormous cleantech potential, Canada lacks a comprehensive policy framework that would enable the sector to reach its full potential.[25]

An analysis of the policy landscape has led to three major ways the federal government could help Canadian cleantech firms to succeed: by building domestic demand for their products, by providing increased international export credit and trade promotion, and by unlocking untapped sources of finance and investment.

Building Domestic Demand

One of the greatest obstacles to the international adoption of Canadian cleantech innovations is, paradoxically, a lack of domestic demand. Canada's domestic market is not large enough to be the only arena for technology companies, but is essential for piloting the deployment of new innovations.[26] Domestic adoption serves as a key enabler for exports, however at present too few Canadian companies and public institutions purchase the clean technologies on their doorstep. A recent study of over one hundred Canadian cleantech companies confirmed that the lack of domestic adoption and domestic references was the number one barrier to their growth abroad: foreign purchasers are understandably reluctant to purchase Canadian cleantech innovations if the domestic market has yet to do so.[27]

In order to reach the large and lucrative global markets that drive growth, Canadian clean technology companies need domestic market adoption. The need for increased domestic procurement from SMEs was recently highlighted as a key finding of the 2011 'Jenkins Report'.[28] It called for the federal government to "make better use of its substantial purchasing power to create opportunity and demand for leading-edge goods, services and technologies from Canadian suppliers".[29] By creating such a 'demand-pull', government can both foster the development of innovative and globally competitive Canadian companies and simultaneously stimulate innovation, greater productivity and lower-cost delivery of public sector goods and services.[30]

International Examples

Canada's international competitors understand the importance and value of domestic procurement programs. The United States leads the world in its use of procurement to stimulate innovation through the Small Business Innovation Research (SBIR) program, which was piloted in 1982 and has since become the world's largest seed capital fund for small businesses.[31] The program legislatively mandates that federal agencies with more than $100 million in annual external contracts set aside 2.5% for small businesses, which translates into annual expenditures of $2 to $3 billion. Every year, over 4,000 projects receive funds from the SBIR program, with the average project receiving $850,000. The SBIR program provides phased awards to manage risk: from $100,000 projects for feasibility studies (Phase I), to $750,000 awards for projects in the development stage (Phase II), to awards distributed to sole-supplier businesses commercializing their projects (Phase III). If a contracted company

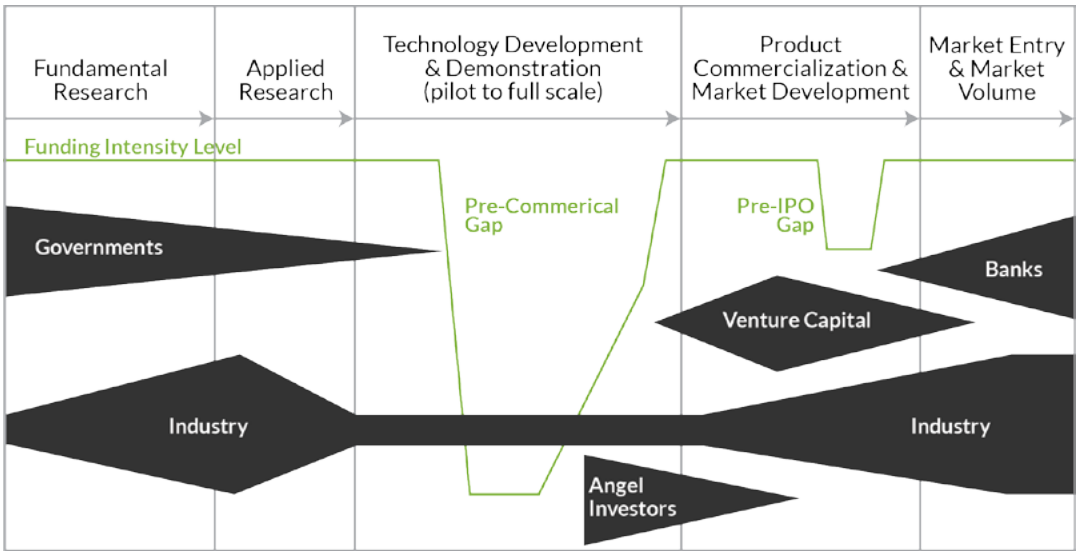
develops intellectual property, the ownership rests with the company. In the 2012 State of the Union address, President Obama announced America's commitment to continuing domestic procurement leadership in cleantech, with the Department of Defence set to make one of the largest clean energy commitments in history through its purchasing power.[33]

The European Commission has had a policy of Green Public Procurement (GPP) since 2004, and is currently engaged in an extensive public consultation on how to further expand and improve its GPP efforts.[34] Public authorities in Europe spend some 16% of the EU's gross domestic product—a sum equivalent to half the GDP of Germany[35]—and EU green procurement now includes energy-efficient buildings, electric cars, environmentally friendly public transport, renewable energy and more. Seven EU states (Austria, Denmark, Finland, Germany, the UK, Sweden, and the Netherlands) now use green procurement for more than 55% of their total contracts. An evaluation of EU green procurement using life cycle costing – which measures the financial and environmental efficiency of a product over its lifetime – found that in addition to stimulating domestic cleantech industries, green public procurement can also result in significant cost savings.[36] Canada has made forays into green procurement, but its efforts are modest by comparison.[37]

Sustainable Development Technology Canada (SDTC)

Canada's flagship organization for funding cleantech is Sustainable Development Technology Canada (SDTC). This organization has achieved international recognition for its work, and in a decade has allocated more than $560 million to over 220 early-stage Canadian cleantech innovations.[38] Importantly however, SDTC does not engage in domestic cleantech procurement. SDTC has identified four stages that a cleantech company must pass through in the course of its growth: fundamental and applied research, technology development & demonstration, product commercialization & market development, and finally market entry & volume. SDTC was established to help fill the cleantech "pre-commercial gap", the phase between early research and the demonstration that a

The Innovation Chain and the Funding Gap



Source: SDTC, The Funding Gap, http://www.sdtc.ca/index.php?page=the-funding-gap&hl=en_CA

technology is commercially viable (known as 'proof of concept'). While SDTC plays a vital role in the early growth of Canadian cleantech companies, it does not engage in later-stage public procurement akin to the American SBIR.

The Canadian Innovation Commercialization Program (CICP)

Canada's only true dedicated federal procurement program is the Canadian Innovation Commercialization Program (CICP), a $40-million, two-year pilot program announced by the federal government in 2010. The CICP operates through a centralized evaluation of new innovative technologies and their subsequent matching to a government department that will deploy them.[39] Although still in its early stages, the CICP has shown great promise, and announced its first round of 35 qualified innovations in early February 2012.[40] Demand for the program was very strong, with over 300 SME applicants for its first two selection rounds.[41]

Programs like the CICP are a 'domestic springboard to international competitiveness', as they provide our export oriented cleantech entrepreneurs with reference customers and valuable experience. Domestic procurement of this type has a clear multiplier effect on the growth of Canadian cleantech companies in key export markets.[42] In comparison with the $2-3 billion spent under the American SBIR, the Jenkins Report found that Canada's deployment of $40 million through the CICP was "exceedingly modest".[43]

Policy Recommendation

The CICP should be expanded beyond its pilot phase, and the cap of $500,000 per contract raised. The Canadian government procures over $15 billion worth of goods and services every year.[44] Designating 2.5% of that amount to SME procurement (the target set by the American SBIR) would channel $375 million per year to Canadian SMEs. This approach, coupled with an explicit policy to procure cleantech products, would be a powerful driver of growth for the sector.

Providing Export Credit

The growing demand for clean technology transcends national boarders, which means that successful cleantech firms find willing markets around the world. Canadian cleantech companies are consummate exporters, and are nine times more likely to sell their products beyond our borders than other SMEs of equivalent size.

When entering foreign markets, Canadian cleantech firms are often in need of buyer finance. There is a large and growing demand for small-scale sustainable infrastructure deployment in emerging markets, including innovations for sustainable cities, rural and urban electrification, water & waste processing, energy efficiency, and others. Such projects generally require between $5 million and $25 million in debt and equity capital,[45] far less than the hundreds of millions or billions that investors and financial institutions seek to deploy in infrastructure investments.[46] This sizing mismatch creates a financing gap that prevents Canadian cleantech companies from reaching their full international potential.

The Canadian Clean Technology Coalition (CCTC) has called for this gap to be closed in part through Canadian contributions to development finance institutions, such as the International Finance Corporation (IFC). An international cleantech equity fund could provide investment capital for projects that fall in the above-mentioned $5 million to $25 million range, while a companion debt fund – led by the private sector but backed by a Canadian sovereign

guarantee to reduce the cost of capital – could provide additional leverage for the cleantech equity investments.[47]

Our international competitors have already taken steps to increase their cleantech success abroad through export finance. In 2011 the US Government announced that the Overseas Private Investment Corporation (OPIC) – America's development finance institution – will invest an additional $300 million in clean energy financing in emerging markets, and will create new debt finance products suited to these target markets.[48]

Canada has the institutional framework needed to close the export finance gap. Export Development Canada (EDC) is a Crown corporation that provides export credit for Canadian businesses seeking to sell abroad. EDC's engagement with the cleantech sector has grown by 55% in the past five years, with nearly 225 clean technology transactions completed in 2010.[49] The organization recently identified cleantech as both a priority and a major driver of future growth.

Policy Recommendation

The Canadian federal government should adopt an aggressive cleantech export policy as a tool for strengthening Canada's late-stage cleantech investment picture. Cooperation between the EDC and the IFC on cleantech, which began in 2012, should be encouraged and expanded.[50] The government should work closely with EDC to explore the idea of extending sovereign guarantees targeted to incentivize investment in Canadian cleantech innovations. All of the above should be complemented by assertive international trade promotion for Canadian cleantech, including high-level trade missions to key target markets.

Unlocking Private Finance & Investment

Given current fiscal realities, there is a limit to how much the government will be able to spend in support of Canadian cleantech. Through the creation of a clear, targeted policy framework, however, government action can unlock vast pools of private capital. In addition to its own efforts to grow the cleantech sector, the federal government should work with private investors to understand their interests and needs around investments in the cleantech sector.

Institutional investors – in particular pension funds – are a central component of the Canadian investment community. Canada is home to a number of sizeable institutional investors, including the Canada Pension Plan and the Ontario Teachers' Pension Plan, each of which have over $100 billion under management. Pension funds are mandated to generate stable, predictable returns over long time horizons, and so are ideal sources of "patient capital". Given the interest of the institutional investor community in long-lived asset classes like infrastructure and bonds, the government could consider how to enable the creation of specialized investment vehicles for cleantech infrastructure investments, such as "green bonds".[51] It could also focus on measures to increase disclosure and information on the investors' environmental and cleantech holdings, as a way of generating interest from fund consumers and other beneficiaries.

In parallel with these efforts, the federal government should engage with the venture capital community to understand how they view challenges and opportunities in the cleantech sector. In general, Canada is adept at conducting advanced cleantech research, but has difficulty translating the innovations it produces into economic activity. The early-stage risk capital needed to make this leap is scarce in Canada, although pioneering institutions such as SDTC and Toronto's MaRS have begun to address this gap.[52]SDTC's internal analysis has shown that each

dollar of public money it deployed leveraged $13 of private sector investments.[53] Despite its success, SDTC flagship cleantech fund – the SD Tech Fund – is set to expire at the end of the 2012 fiscal year. Without early-stage risk capital support, promising Canadian clean technologies will either wither on the vine or go south to the United States, where there is a much stronger appetite for early-stage risk.

Policy Recommendation

Canada would benefit from a strong institution that could provide a 'full service' approach to the cleantech sector. A good example of such a body is the UK's Carbon Trust, which does everything from investing in deployment projects, to venture capital advisory, to providing specialist support on the commercialization of low-carbon technologies.[54] SDTC is well placed to fill this role in Canada, and could easily provide expert advice on questions of domestic cleantech procurement and international export finance for Canadian clean technologies. An expanded SDTC could also advise on the possible use or expansion of public investment funds to help reduce cleantech investment risk for both long-term and early-stage investors.

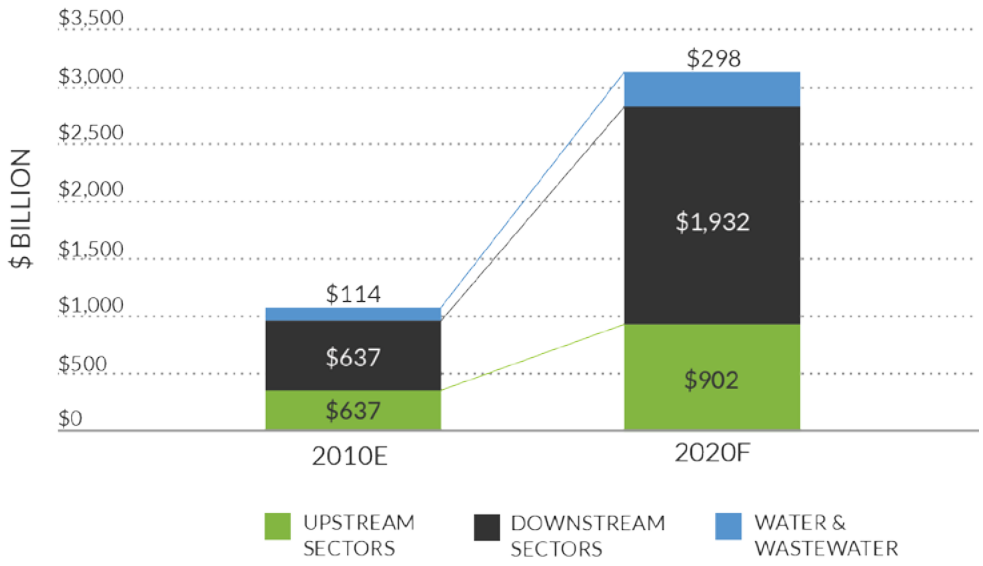
Conclusions

The world economy is entering a paradigm shift: energy, climate and resource challenges will fundamentally reshape the roots of our collective prosperity, but they will also create vast new markets and opportunities.

Canada's success in the economy of tomorrow will be based on the investments and policies we pursue today. Through smart policies to boost domestic clean technology demand, expand export financing, aggressively pursue international markets and unlock private capital flows, Canada can achieve its full potential as global cleantech competitor. Creating a strong public institution to lead the charge on cleantech would further reinforce these policies and set Canada on the path to capture tens of billions of dollars from the global cleantech market.

The Canadian cleantech industry contains the seeds of our future prosperity. We must now summon the vision and leadership we need to reach the full measure of our potential and win the markets of the future.

Global Clean Technology: 2010 Estimate & 2020 Forecast Revenue



Sources: GBI Research, Lux, BERR LCEGS, Roland Berger, Analytica Advisors

'Upstream' technologies include biofuels & bioenergy and power generation. 'Downstream' technologies include energy Infrastructure, smart grids, remediation & Soil Treatment, transportation, recycling & recovery, energy efficiency and industrial processes.

Notes

1. Jeremy Grantham, Time to Wake Up: Days of Abundant Resources and Falling Prices Are Over Forever, April 2011, http://www.gmo.com & http://www.lexariaenergy.com/pdf/JGLetterALL_1Q11.pdf

2. McKinsey & Company, Resource Revolution: Meeting the World's Energy, Materials, Food and Water Needs, 2012, http://www.mckinsey.com/Features/Resource_revolution

3. International Energy Agency, World Energy Outlook 2008, Executive Summary, November 2008, http://www.iea.org/Textbase/npsum/WEO2008SUM.pdf

4. Cleantech encompasses innovations in sectors as varied as power generation, water, waste, recycling, and the efficient use of energy and resources. See Velma McColl, After Cancun: Time to Shift Strategy, February 2011, http://www.irpp.org/po/archive/feb11/mccoll.pdf [McColl - Cancun]; See also The Cleantech Group, What is Cleantech? http://www.cleantech.com/what-is-cleantech/

5. Canadian Clean Technology Coalition, The 2011 Canadian Clean Technology Industry Report – Executive Summary, http://www.analytica-advisors.com/download-2011-highlights [CCTC - 2011 Report]

6. Analytica Advisors, Spotlight on Cleantech No. 3, January 2012, http://www.analytica-advisors.com/sites/default/files/Spotlight%20on%20Cleantech%20No.3.pdf, drawing data from GBI Research, Lux, BERR LCEGS & Roland Berger. See also Velma McColl, "Harnessing Energy for Change", Policy Options, February 2012, http://www.irpp.org/po/archive/feb12/mccoll.pdf

7. CCTC - 2011 Report, see note 5.

8. Aerospace Industries Association of Canada, Key Facts on Canada's Aerospace Industry, http://www.aiac.ca/uploadedFiles/Canadian%20Aerospace%20Fact%20Sheet(1).pdf

9. Stanford, Jim (2008). "Staples, Deindustrialization, and Foreign Investment: Canada's Economic Journey Back to the Future," Studies in Political Economy 82, pp. 7–34. http://spe.library.utoronto.ca/index.php/spe/article/view/5098/1937

10. Cross, Philip "Recent Trends in Business Investment," Canadian Economic Observer, March 2011, pp. 3.1–3.12.

11. The most prominent of these is the so-called "Dutch disease", which refers to the phenomenon whereby a country's specialization in the exploitation and export of natural resources leads to the appreciation of its currency and the subsequent decline of its manufacturing sector. See Célestin Bimenyimana and Luc Vallée, "Curing the Dutch Disease in Canada", Policy Options, November 2011, http://www.irpp.org/po/archive/nov11/bimenyimana.pdf; Michel Beine, Charles S. Bos and Serge Coulombe, Does the Canadian economy suffer from Dutch Disease?, University of Ottawa, Canada, January 2009, http://www.economie.uqam.ca/pages/docs/Beine_Michel.pdf

12. Government of Canada, Innovation Canada: A Call to Action ('The Jenkins Report'), Executive Summary, http://rd-review.ca/eic/site/033.nsf/vwapj/R-D_InnovationCanada_Final-eng.pdf [Jenkins Report]

13. Canadian Clean Technology Coalition, Submission to the House of Commons Standing Committee on Finance for the 2012 Budget, http://www.canadiancleantechnologycoalition.ca/media/docs/2012_Finance_Submission_Canadian_Clean_Technology_Coalition.pdf

14. Sustainable Development Technology Canada, SDTC & Leveraged Funding by Sector and Province, http://www.sdtc.ca/index.php?page=Economic-Sectors-By-Province&hl=en_CA

15. CCTC - 2011 Report, see note 5.

16. CCTC - 2011 Report, see note 5.

17. McColl – Cancun, see note 4.

18. CCTC - 2011 Report, see note 5.

19. KPMG China, China's 12th Five-Year Plan: Overview, March 2011, http://www.kpmg.com/

CN/en/IssuesAndInsights/ArticlesPublications/Publicationseries/5-years-plan/Documents/China-12th-Five-Year-Plan-Overview-201104.pdf

20. Remarks by the President in State of the Union Address, January 24, 2012, http://www.whitehouse.gov/the-press-office/2012/01/24/remarks-president-state-union-address [State of the Union 2012]

21. UK Green Investment Bank, http://www.bis.gov.uk/greeninvestmentbank

22. Clean Energy Finance Corporation, Expert Review, http://www.cefcexpertreview.gov.au/content/Content.aspx?doc=home.htm

23. National Round Table on the Environment and the Economy, Measuring Up: Benchmarking Canada's Competitiveness in a Low-Carbon World, 2010, http://nrtee-trnee.ca/wp-content/uploads/2011/08/benchmarking-eng.pdf

24. Alex Wood, Canada and the Green Economy, Report commissioned by the Canadian Environmental Grantmakers' Network, May 2011, pp. 7-8.

25. McColl – Cancun, see note 4.

26. Jenkins Report, p. 7-4, see note 12.

27. Canadian Clean Technology Coalition, Coalition Submission: Federal R&D Review, http://www.canadiancleantechnologycoalition.ca/media/docs/Cleantech_RD_Submission.pdf

28. Jenkins Report, see note 12.

29. Jenkins Report, Executive Summary, see note 12

30. Jenkins Report, Executive Summary, see note 12

31. Jenkins Report, p. 7-3 to 7-4, see note 12. See also Small Business Innovation Research (SBIR) Program, http://www.sbir.gov/about/about-sbir

32. Jenkins Report, Box 7-1, see note 12. See also David Connell, Secrets of the World's Largest Seed Capital Fund: How the United States Government Uses its Small Business Innovation Research (SBIR) Programme and Procurement Budgets to Support Small Technology Firms, Cambridge: Center for Business Research, 2006, http://www.cbr.cam.ac.uk/pdf/SBIR%20Full%20Report.pdf

33. State of the Union 2012, see note 20.

34. European Commission, Green Public Procurement, http://ec.europa.eu/environment/gpp/index_en.htm

35. European Commission, Buying Green! - Handbook on green public procurement, http://ec.europa.eu/environment/gpp/pdf/buying_green_handbook_en.pdf

36. European Commission, Collection of statistical information on Green Public Procurement in the EU, 2009.

37. Public Works and Government Services Canada, Policy on Green Procurement, http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html

38. SDTC Portfolio, http://www.sdtc.ca/index.php?page=SDTC-Portfolio&hl=en_CA

39. Public Works and Government Services Canada, Overview of CICP, 2011, https://buyandsell.gc.ca/initiatives-and-programs/canadian-innovation-commercialization-program-cicp/overview-of-cicp

40. Public Works and Government Services Canada, Harper Government Helps to Kick Start Canadian Entrepreneurial Businesses, February 3, 2012, http://www.tpsgc-pwgsc.gc.ca/medias-media/gp-pg/2012-01-eng.html

41. Analytica Advisors, Spotlight on Cleantech No. 5, February 2012, http://www.analytica-advisors.com/

42. Canadian Clean Technology Coalition, 2011 Prospectus, http://www.canadiancleantechnologycoalition.ca/media/docs/CCTC_Prospectus_EN.pdf

43. Jenkins Report, p. 7-2, see note 12.

44. Public Works and Government Services Canada, The Procurement Process, https://buyandsell.gc.ca/process

45. Canadian Clean Technology Coalition, International Finance for Exports, http://www.canadiancleantechnologycoalition.ca/media/docs/CCTC_International_Finance_for_Exports_Submission.pdf [CCTC - Int'l Finance]

46. OECD, Pension Fund Investment in Infrastructure, 2009, www.oecd.org/dataoecd/41/9/42052208.pdf

47. CCTC - Int'l Finance, see note 45.

48. Renewable Energy World, US Plans for

Green Exports, February 24, 2011, http://www.renewableenergyworld.com/rea/news/article/2011/02/policy-and-markets-exporting-us-renewables

49. Export Development Canada, EDC finances waste-to-energy plants in China, January 24, 2012, http://www.edc.ca/EN/About-Us/News-Room/News-Releases/Pages/edc-finances-waste-energy-plants-china.aspx

50. Export Development Canada, EDC and IFC deepen partnership to expand trade, infrastructure and cleantech sectors in emerging markets, http://www.edc.ca/EN/About-Us/News-Room/News-Releases/Pages/edc-ifc-partnership.aspx

51. In 2008, an Action Canada Policy Task Force published a comprehensive policy recommendation on Green Bonds, See http://www.greenbonds.ca/

52. The Business Development Bank of Canada (BDC), a Crown corporation akin to EDC, has an 'Energy/Cleantech Venture Fund', but its investments usually flow to later-stage firms. See BDC, Energy/Cleantech Venture Fund, http://www.bdc.ca/en/solutions/venture_capital/our_team/direct_investment/Pages/electronics.aspx

53. SDTC, SDTC Congratulates Government of Canada on 2011 Budget Investment, http://www.sdtc.ca/index.php?mact=News,cntnt01,detail,0&cntnt01articleid=239&cntnt01origid=274&cntnt01detailtemplate=news-details&cntnt01returnid=143&hl=en_CA

54. UK Carbon Trust, http://www.carbontrust.co.uk/

This project has been undertaken pursuant to an Action Canada fellowship. Action Canada Foundation (www.actioncanada.ca), doing business as Action Canada, is a registered charity funded in part by the Government of Canada with a mandate to build leadership for Canada's future. Neither the contents nor the conclusions of this publication have been endorsed or approved by Action Canada Foundation, Action Canada or the Government of Canada.

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