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# HOW TO ACCELERATE COLLABORATION WITH ASIA IN CLEAN TECHNOLOGY



ASIA PACIFIC  
FOUNDATION  
OF CANADA

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## BACKGROUND

Asia is transforming before our eyes: China and India have become engines of global growth; Japan and Korea are joining the ranks of the most developed states; and, ASEAN countries are on the path of accelerated development. Canada has a tremendous opportunity to take advantage of this transformation by immediately beginning to deepen its engagement in the region and diversify its partnerships. Through a proactive approach, Canada will not only strengthen its global strategic positioning, establishing itself as a relevant and important partner to Asian countries, but will also ensure that Canadians are beneficiaries of Asia's continued development and growth.

Collaboration with Asia in the area of clean technology presents an ideal vehicle for advancing such a strategy as it allows Canada to leverage its strengths in innovative research, services, and technologies, while helping Asian partners address a set of high priority, critical, non-traditional security threats e.g., climate change, water, and energy security. Collaboration in this arena has the potential to be a true partnership as the transfer of knowledge and resources would be bi-directional: the Asia Pacific region is home to some of the most innovative countries in the world. A number of countries in the region have the financial resources to help catalyze new ideas, deepen research capacities, and scale ideas up to fit a wide set of consumers. The complementarities that exist in various sectors can provide the bedrock for fruitful cooperation.

However, for this vision to be realized, the Government of Canada must adopt a more targeted and strategic approach to the international dimensions of its science, technology, and economic policy. The political leadership must signal to their Asian counterparts that collaboration in clean technology has high level government support. The Government of Canada must further prioritize funding for international collaborative initiatives and harmonize the programs and assistance provided to clean technology researchers and companies across the different branches of government: Environment Canada, Global Affairs Canada, and Innovation, Science and Economic Development. Business models that are working in terms of fostering innovation and progress in the clean technology arena need to be built on and lessons learned from both successful and failed initiatives need to be collected and shared broadly throughout the clean technology community.



## THE CANADIAN CLEAN TECHNOLOGY INDUSTRY AND OPPORTUNITIES IN ASIA

The Canadian clean technology industry has been developing rapidly over the last decade and continues to be a significant contributor to our economy. It is a large scale employer and a high investor in innovative technology as well as a big exporter.

However, despite growth in the global market, Canada has been losing global market share in the clean technology field, particularly in the renewable energy and energy efficiency space. According to Analytic Advisors, “Canada is the world’s third greatest loser of market share since 2005 after the UK and Japan. Its market share declined by 41 percent from 2.2 percent to 1.3 percent, again, at a time when the global market doubled.”<sup>1</sup> If we are to establish a future leadership role, we must take action to galvanize our clean technology industry and regain market share.

Canada needs to find growing markets and we are fortunate enough to have Asian partners who represent such markets. Opportunities in Asia are big, especially in China, India, and ASEAN countries, because of its economic development and green growth policy. For instance, China represents the third largest market for Canadian clean technology exports after the US and Europe.

Green growth is an increasingly important policy principle across the Asia Pacific region. Just last year, energy ministers of ASEAN nations adopted the target of 23 percent renewable energy use in the fuel mix for the ASEAN region by 2025. In China’s case, reducing pollution and ecological/climate damage were noted as clear and important policy priorities in its 13<sup>th</sup> five-year plan for green development. China represents 21 percent of the global market in clean technology and is the fastest growing exporter of clean technology. By comparison, South Korea ranks 5<sup>th</sup> and represents 3 percent of the market.<sup>2</sup>



## AREAS OF FOCUS

Many countries in Asia aim to meet growing energy demand and address climate change by increasing the role of renewables in the power mix and enhancing energy efficiency. India, for example, aims to have 175 GW of renewable energy online by 2022 of which 100 GW will be solar. According to the *Energy Development Strategy Action Plan (2014-2020)*, China aims to have an installed solar energy capacity of 100 GW and a wind energy capacity of 200 GW by 2020. While many Asian countries have growing renewable energy technology industries, not all needs will be able to be met domestically. Their plans open niche opportunities for Canadian renewable technology and energy efficiency companies.

In view of the needs of Asian countries and the strengths of Canadian companies, Canada can focus on the following areas for the Asian market:

- **Water Conservation and Reclamation**  
Asia is facing serious water shortages. China and India lack sufficient water for both residential and industrial use, and both countries experience water quality problems. In China, coal gasification, mining remediation, and landfill leachate management are in growing demand because of water shortage and environmental policies. Opportunities for water monitoring, conservation, remediation, and wastewater

treatment are growing significantly across the entire region. Canada has significant expertise in clean water technology and can supply technologies and products that address Asia's growing demand for efficient water usage, water reclamation, and wastewater treatment.

- **Smart Grid/Smart Metering**  
Smart grid is a modern electric system that uses digital technology to improve the reliability and efficiency of the grid. Smart grid systems are multi-directional and can accommodate distributed energy sources and electric vehicle charging. Canada has strengths in smart grid, especially in the area of smart metering and demand response technologies. In Ontario, the Smart Meter Energy Initiative began in 2004, and time-of-use pricing for electricity was instituted in 2010. BC's 2010 Clean Energy Act required BC Hydro to install smart meters for its customers. As a result, Canadian utilities and power regulators have extensive knowledge on how to implement smart meter programs as well as data on the impacts of time-of-use pricing that can help other jurisdictions evaluate their metering options. This knowledge could be provided through consulting services.

- **Energy Storage**

New types of energy storage can allow utilities and communities to use more renewable energy sources, which are highly variable in their output based on weather conditions and other factors. Canada has developed a cluster of companies with expertise in energy storage, including flywheel, underwater pressurized, and pumped hydro storage systems.

A number of these companies are already engaging in two-way exchange with counterparts in Asia. For example, Toronto-based eCAMION has developed a novel energy storage system based on Lithium-ion batteries, termed Community Energy Storage (CES). eCAMION has formed a partnership with Larsen & Toubro, a large Indian engineering company, to introduce eCAMION's community energy storage system to communities in Tamil Nadu, India.<sup>3</sup>

- **Fuel Cells and Green Transportation**

Canadian companies have also developed expertise in fuel cells for vehicles as well as hydrogen fuelling stations. Mississauga-based Hydrogenics recently entered a \$13.5 million strategic partnership with a Beijing-based company to provide hydrogen fuel cells for buses and trucks. Vancouver-based Ballard Power Systems provides fuel cells for use in trams and buses in China<sup>4</sup> and is currently working in partnership with a Japanese company (which is also a shareholder) to improve the performance and lower the cost of its fuel cells.<sup>5</sup>

- **Technologies to Make Fossil Fuel Extraction and Use Cleaner**

Many countries in Asia remain interested in maximizing their domestic fossil fuel resources. Both China and India, for example, are interested in technologies for accessing shale oil and gas resources, but also increasing water efficiency and lowering the CO<sub>2</sub> emissions associated with extraction. China is exploring opportunities to implement carbon capture and use technologies to help make the burning of fossil fuels, especially coal, cleaner. Canada has expertise in both areas and is home to the world's first post-combustion coal-fired carbon capture and storage facility at Boundary Dam Power Station in Saskatchewan.



## RECOMMENDATIONS FOR THE CANADIAN GOVERNMENT

Canada’s clean technology opportunity in Asia goes beyond new markets for completed products and services. Collaboration needs to occur throughout the clean technology development process: in the research and development, demonstration and commercialization, and export/market entry phases. The Government of Canada has a critical role to play in galvanizing and coordinating action among the various stakeholders in industry, academia, and the NGO sector. Below are a set of recommendations for Government to consider:

- ***Provide political and financial support for expanding successful models of cross-Pacific research collaboration.***

Canadian universities and research institutions have been successful in collaborating with Asian partners on technology innovation and pilot projects in the field. Some notable cases are the IC-IMPACTS model and University of Guelph Water Research Network. With assistance from government, these models should be replicated in other parts of the region.

- *IC-IMPACTS* (the India-Canada Centre for Innovative Multidisciplinary Partnerships to Accelerate Community Transformation and Sustainability) is a unique Canada-India research center. It brings together researchers, innovators, and even government

agencies from both countries and has resulted in numerous publications, patents, and even successful start-up companies. The model is praised for its ability to harness the right expertise and resources from both countries and channel them towards finding solutions to quality of life issues faced in both Indian and Canadian communities.<sup>6</sup>

- *University of Guelph- Nankai University national water research network*  
This recently launched project involves 37 water researchers at 22 universities across Canada. They will focus on surface and groundwater contamination, infrastructure failure, flood and drought control, and solid waste management. Researchers will work in dedicated laboratories in China and conduct fieldwork, and consider a range of solutions, from low-tech water treatment for small rural populations to sophisticated contaminant warning systems and risk assessment tools.

- **Expand funding mechanisms for furthering industrial research and development.**

The Government of Canada should consider the further expansion of the Canadian International Innovation Program (CIIP), and continue an emphasis on clean energy, energy efficiency, and water-based technologies.

- **Facilitate outside-Canada demonstrations.**

In some markets, providers of technology need to demonstrate technology locally before the buyer will make a purchase. Government needs to consider the balance of restrictions on locations where feasibility and demonstration funds can be used. For example, Sustainable Development Technology Canada could expand funding for demonstrating technology outside of Canada. Some of this funding could be recovered if the feasibility study/demonstration results in a sale.

- **Provide political and financial support to Canadian incubators in Asia.**

Drawing on the model of successful technology incubators like the Digital Media Zone (at Ryerson University) which have established an Asia presence, the Government of Canada should help Canadian incubators either develop or build on existing clean technology programs and launch them across Asia. These incubators would be encouraged to collaborate with Asian partners to provide resources, services and funding to support clean technology start-ups and demonstration projects in key Asian countries.

- **Collect and share in-depth data and intelligence on clean technology market opportunities in Asia.**

Canadian clean energy technology companies need high-quality data and information about developments in Asian markets, including

developments on IP protection in Asia. The Government of Canada could develop a cadre of clean technology officers attached to the trade commissioner service who would be responsible for collecting this information and supporting Canadian companies interested in exporting into their markets.

- **Build Asia competency.**

Studies conducted by the Asia Pacific Foundation of Canada indicate that one important barrier preventing Canadian companies from entering Asian markets is that they lack Asia competent workers: staff that has knowledge of the Asian business environment and culture and possess relevant language skills. To address this gap, the Government of Canada needs to invest in young people, supporting programs for young people to study and work in Asian countries so that our new generation of workers has the needed training.

- **Support the development of Canadian industry consortia.**

Small and medium-size enterprises (SMEs) are a major generator of jobs in Canada, and Canada's clean technology export industry is dominated by SMEs. However, they often do not have the resources to explore international markets or finance in-country demonstrations of technology. The Government of Canada should provide incentives for its largest corporations with experience doing business in Asia to build consortia drawing on talent and expertise residing in Canadian SMEs. Denmark and Japan have been very successful in fostering this model of business partnership.

- **Join the Asian Infrastructure Investment Bank.**

The Asian Infrastructure Investment Bank is likely to be at the centre of development of numerous international public-private partnerships that will finance and deliver clean technology infrastructure in Asia. The Government of Canada should join the bank as a member at the first opportunity that emerges and second Canadian experts to its staff. These experts will become a valuable source of information to Canadian companies about upcoming procurement opportunities and will also help inform international engineering and construction companies about expertise available for sub-contracting from Canada.

As we enter a post-COP21 world, the global goal has been set: to use clean technology and innovation to stimulate economic growth and create jobs while transitioning to a low-carbon economy. By fostering collaboration on clean technology between Canada and Asia, the Government of Canada will not only position Canada as a leader in promoting low-carbon economies, but will also catalyze Canadian innovations and create jobs at home.

## ENDNOTES

1. <http://analytica-advisors.com/assets/file/AA%20-%20English%20news%20release.pdf>
2. Analytica Advisors, 2016 Canadian Clean Technology Industry Report, p.6., <http://analytica-advisors.com/files/english-synopsis>
3. <http://www.ecamion.com/ontarios-trade-mission-to-india/>
4. <http://ballard.com/about-ballard/newsroom/news-releases/news01211601.aspx>
5. <http://ballard.com/about-ballard/newsroom/news-releases/news01201601.aspx>
6. A more ambitious model can be found in the US-China Technology Research Center. The Center was established by formal agreement between the United States and China and is supported by public and private funding from both countries. Work plans and public-private research consortia are developed around four priority areas: coal-tech, clean vehicles, building energy efficiency, and the energy-water nexus. The benefits of this model are strong. The agenda serves the interests of both countries, models for collaborative IP are developed in advance, and the involvement of private sector entities results in additional know-how and “built in” end users of the technology. Canada could consider establishing a centre of this type around one technology area.