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Submission to the Senate Standing Committee on Energy, the Environment and Natural Resources

“A Study on the Effects of Transitioning to a Low Carbon Economy (as required to meet the Government of Canada’s announced targets for greenhouse gas emission reductions)”

November 15, 2016

The Government has expressed its intention to:

- Put a price on carbon starting at a minimum of \$10 per ton in 2018, rising by \$10 each year to \$50 per ton in 2022;
- Implement an innovation strategy building world-leading clusters and partnerships, growing companies, and accelerating clean growth;
- Establish an investment concierge service to attract more foreign investments in Canada, and measures around the newly announced global skills strategy.

The purpose of this submission is to elaborate on the policies and support needed to commercialize clean technology and to continue to grow the Sarnia cluster including the attraction of BioAmber’s next plant.

Context

BioAmber is an industrial biotechnology company producing renewable chemicals – exactly the same chemicals made from petroleum but we make them from sugar instead of fossil fuels. Our chemicals are used to make plastics, resins, coatings, de-icers, personal care products, and food and flavorings.

We are operating the largest biochemical facility in Canada in Sarnia, Ontario. Our new facility is the second largest biochemical facility in North America, the largest being the Natureworks plant in Blair, Nebraska producing lactic acid at a Cargill facility.



BioAmber's CEO Jean-François (JF) Huc, is one of the leaders of SMART Prosperity, a diverse group of leaders from business, labour, youth and environmental groups who share a vision for a stronger, cleaner economy. Many of the actions recommended in this brief are informed by our commitment to this vision and the actions recommended in SMART Prosperity's brief, "Accelerating Clean Innovation".

Industrial biotechnology is an important pillar of clean technology that:

- Enables the production of renewable chemicals, materials, and fuels;
- Reduces green-house gas emissions – BioAmber's Sarnia plant reduces 100% of GHG emissions compared with the petroleum. The Sarnia plant uses 64% less energy and has significant water recycling;
- Generates manufacturing jobs;
- Offers a growing opportunity for biobased chemicals. The chemicals industry accounts for 30% of the total industrial energy demand worldwide and is responsible for 20% of industrial GHG emissions (IEA 2013); and
- Converts agriculture and forestry products into value added products.

BioAmber Sarnia represents over \$160M of capital investment and 60 full-time high value added jobs. In addition to increased sales, we witnessed a growing number of companies qualifying our product. To date over 180 companies have qualified our bio-succinic acid, with 40 of these companies actively purchasing it from BioAmber. The continued conversion from qualified to purchasing is being dynamically managed to match our production ramp. At full capacity (2017), the plant will produce 30,000 MT of succinic acid of which more than 95% will be exported.

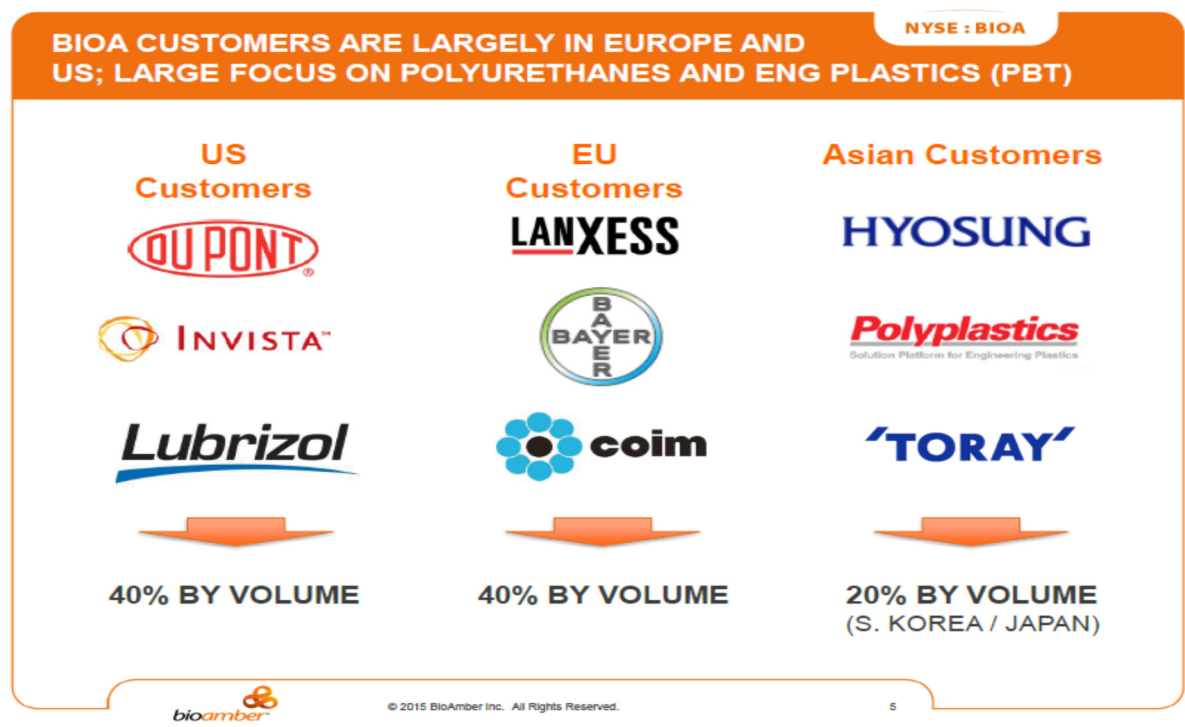
BioAmber's mission is to be, "A fast growing producer of chemical intermediates that use sugars instead of fossil fuels and sells competitively priced, sustainable chemicals with strong profit margins and the cleanest environmental footprint in the industry."

We use glucose or high fructose corn syrup – the most inexpensive and readily available source of sugar currently on the market. The market for high fructose

corn syrup is declining because of dietary concerns, we provide new markets for this agriculture commodity produced in Canada. BioAmber can employ other types of sugars and in future, we will be moving to cellulosic sugars from agricultural residuals thus improving our environmental footprint even further.

BioAmber can transform its bio-based succinic acid into 1,4-Butanediol (BDO) and Tetrahydrofuran (THF). BDO and THF are used to make engineering plastics, polyurethanes, biodegradable polyesters, spandex and other specialty chemicals representing a US \$6 billion market. Canada does not produce either BDO or THF.

Making a key intermediate ingredient in common industrial and commercial products will increase the competitiveness of Canadian manufacturers. Cost competitiveness will attract additional investment in the supply chains necessary to support these products.



BioAmber's next plant will be a US\$500M facility producing 70,000 MT of BDO and 24,000 MT of THF. We make exactly the same chemicals, but they are bio-based, rather than being petroleum based, providing the products made with our BDO and THF a significantly better environmental footprint with considerably lower GHGs. We are in the process of siting the plant.

Policy and Business Environment Needed to Promote Industrial Biotechnology

1. Early stage innovation

The R&D tax credits already in place are very strong. Provincial enhancements of these credits provide even more support.

Funding available through the National Research Council and provincial organizations such as the Ontario Centers of Excellence should continue their focus on industrial applications that can increase the competitiveness of Canadian companies and subsidiaries.

Create targeted research chairs. Expand the role of universities as a knowledge diffuser to firms and as a resource to government and investors.

2. Piloting and Demonstration (First Valley of Death)

We would recommend several flexible, multi-use platforms across Canada that have dedicated personnel (operators and engineers), fermentation equipment and purification equipment: facilities are rented for defined periods of time to prove out and improve technology (e.g., Bio-demo, NRC).

SRED tax credits should be administered in a way to better support piloting, demonstration and scaling of new technologies and processes within existing operations, effectively encouraging capital investment with the positive results of R&D. This means in part more knowledgeable administrators within government willing to assist companies in utilizing the system.

The government needs to reverse the decision to exclude capital expenditures from SRED.

SDTC – expand role of SDTC beyond piloting and demonstration – and shift focus away from fuels – chemicals and materials represent greater value added.

3. Getting Capital into the Clean Tech Sector

There is a need to increase the amount of private sector investment in clean technology companies. This is the most important step in supporting commercialization and the broad diffusion of technology adoption.

The requirement is for affordable capital to support commercial scale investment and the need to deploy capital from investors who are traditionally risk adverse.

Increasing the Availability of Low Cost Capital

Low interest and long term (10 year plus) loans are required. A good model is the US Department of Energy (DOE) Renewable Energy and Efficient Energy Program

http://energy.gov/sites/prod/files/2014/07/f17/REEE%20Solicitation%20Presentation%20July%202014_0.pdf

The US DOE program spreads the financial risk across a portfolio of loans. The recipient of a loan pays fees that reflect the credit risk of a project and the likelihood of default. Borrowing is directly from the US Treasury. This effectively takes the transaction out of the hands of commercial lenders making it easier to finance commercial scale projects.

The design of government support programs is critical. Government support should reflect appropriate due diligence but be willing to support acceptable risk that Canadian commercial financial institutions do not take.

Crown Corporation Lending and Expertise

In the past, crown lending agencies such as Export Development Canada have undertaken initiatives to support clean technology. In 2014 EDC launched a “clean tech” initiative aimed at providing greater flexibility in providing lending and other financial services to clean tech companies. Although this initiative has had some positive outcomes, lending to clean tech companies other than wind and solar, which have guaranteed returns, by crown corporations and Canadian lending institutions remains woefully sparse.

BioAmber convinced EDC and a consortium of lenders including Farm Credit Corporation and Comerica (note no Canadian bank would join the consortium) to provide project financing of \$20 million. Although slightly unconventional, the fees on this financing (primarily legal fees) were approximately \$1 million representing an unacceptable legal fee for companies that are already lacking adequate capital.

The fees for lending by crown corporations specifically to small and medium sized enterprise should be capped or held to specific percentages of the funding.

During the project due diligence, BioAmber brought in SDTC personnel familiar with the project to confirm the technology. The project was also subject to an independent engineer’s report. Due diligence is key to derisking a project.

Ongoing conversations and relationships between EDC, FCC, BDC and SDTC are useful in ensuring that the full weight of the government’s commercial financing and clean tech expertise are brought to bear on clean tech projects.

EDC should develop clean tech sector expertise that is informed by a real knowledge of global supply chains for bio-materials and clean technology in addition to market expertise so as to be more persuasive in bringing Canadian commercial financing to the fore in this area.

Tax Policy to Promote Investment in Clean Technology

The capital gains tax could be lowered or eliminated on investments made by individuals or specialty investment vehicles in clean tech companies that are public and have substantial investments in Canada.

The reduction of capital gain taxes for investments in such companies will drive investment by increasing the return investors make in the sector.

It is important that this capital gains reduction be available to both Canadian and international companies as long as they have a substantial presence in Canada. It could require that any such companies have a TSX or Canadian listing which will have the added benefit of increasing the number of listings on the exchange and creating a market for such investments.

This program could have a 10 year initial period to study its effectiveness. The reduction in revenue would be more than made up from the investments in Canada by companies whose shareholders would benefit from the new policy.

Lastly, the rigorous due diligence that investors require would still be necessary as losses would not be offset for an investor.

4. Other Policy Tools

The promotion or creation of clusters so that emerging companies can benefit from experience of early movers: leverage local trades, suppliers, infrastructure, training (e.g. Sarnia).

Mix global scale with regional economic strengths, e.g., the chemical infrastructure and rich agricultural lands in South Western, Ontario. Align federal and provincial actions.

The Canadian agricultural sector represents significant potential to contribute to the development of industrial biotechnology. The agricultural sector represents: a significant source of biomass materials and feedstock; potential investment funds through cooperatives and the building of agricultural based businesses; the potential to rapidly diversify traditional markets; and the incorporation of more environmentally sustainable materials through the production value chain.

Promotion of the use of renewable products/procurement by government (materials, chemicals) by giving them preference in government procurement

(e.g., US bio-preferred). Consider legislating the use of certain renewable products where it makes sense, such as plastic bags made with biodegradable plastics, or BPA in canned goods (e.g. Italy legislation).

Focus R&D on greening the supply chains of manufacturers so as to bring new products to market more quickly, e.g., use of biobased materials by OEMs and auto parts makers.

For support programs such as Advanced Manufacturing and the Automotive Innovation Fund, a premium should be offered if the innovations being funded have an environmental benefit through the value chain, e.g., the incorporation of soy-based foams for automotive seating.

Expanding export potential by concluding trade agreements with the European Union and South Korea and negotiating agreements with other countries such as Japan.

Get talent into companies by making it easier to recruit foreigners with relevant experience particularly in scale up and global marketing. Applications for work permits and residency permits should be obtained through a streamlined process.

Expand internship and apprentice programs to bring on young Canadians in technology programs related to the clean tech sector and industrial biotechnology.

Encourage linkages between traditional First Nations' concerns for preservation of the land and environment and the development of clean technologies particularly as they relate to the instruction of science in elementary and high school.

Provide scholarships to First Nations students to encourage their pursuit of training and employment in this sector.



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