

Executive Summary

CHAR Technologies (CHAR) is looking to partner with the government of Canada to further its work as an Ontario-based company that uses made-in-Canada technology to help clean biogas, create renewable natural gas, and develop GHG-free biocoal. CHAR's revolutionary technology will increase productivity for Canadians and Canadian businesses and organizations while creating jobs, maintaining economic productivity, and helping the government achieve its GHG reduction targets.

In an effort to continue to promote economic growth, and recognizing that more productive people are more productive and competitive businesses can lead to enhanced growth and prosperity, CHAR is pleased to participate in the 2018 pre-budget consultation process and appreciates the opportunity to share with the members of the House of Commons Standing Committee on Finance, our priorities for the 2018 federal budget.

CHAR's success will facilitate economic productivity because CHAR's own story is one of innovation, resourcefulness, and impact.

Canadians are conscious of our impact on the environment. In fact, according to Vote Compass, CBC's online voter engagement survey, the economy and the environment are two of the most important issues in the minds of Canadians.

CHAR recognizes that Canadians want environmentally responsible measures that assist with economic productivity. There is also a direct link to productive and competitive businesses and organizations and productive Canadians.

CHAR has developed a series of products that will help increase productivity while reducing GHGs.

Through a partnership with government, CHAR could expedite and scale its patented activated biochar technology called SulfaCHAR, which is a cost-effective, convenient, and zero-waste solution for cleaning hydrogen sulfide (H₂S) from renewable natural gas. SulfaCHAR works by removing the toxic H₂S from biogas in the same way that a Brita water-filter removes contaminants from tap water. Once H₂S is removed, the clean biogas can be used for multiple energy applications.

Once the SulfaCHAR is spent and must be replaced, the spent material is a fertilizer, not a waste. Worldwide, it is estimated that \$3 billion is spent annually removing H₂S from renewable natural gas before it can be utilized for heating or the production of electricity.

More recently, CHAR has developed its new product, biocoal, which is a replacement for traditional fossil coal. CHAR's bio-coal is developed using made-in-Canada technology that converts existing excess bio-waste from agriculture, forestry, and landfills into a carbon-neutral coal product with **zero** GHG emissions.

CHAR's bio-coal will source local, existing bio-resources, including fibrous bio-wastes and lower value wood that sits in abundance and create a bio-coal product that is sustainable, efficient, produces zero greenhouse gas emissions, and will create jobs and economic benefits

in Ontario. It shares many of the chemical properties and traits of traditional fossil coal, allowing for easy industry integration and will help steel and cement producers reduce their GHG emissions while maintaining economic production. Finally, CHAR's bio-coal will help government phase out coal-fired electricity by 2030 as part of its comprehensive plan to make Canada a leader in green energy, while at the same time, providing industry with the tools to maintain economic production.

CHAR is at the forefront of Canadian green innovation and looks forward to contributing to policy development in a meaningful way and is a world leader in the development of bio-coal that will reduce Canada's dependence on the traditional fossil coal and will allow industry to maintain economic production.

This submission addresses the key themes the committee is focusing on: productivity and competitiveness. CHAR is confident these budgetary recommendations will help the Finance Committee and Government of Canada reach their objectives in preparation of Budget 2018.

CHAR's recommendations are:

1. That the government of Canada contributes \$2 million in funding to help CHAR complete construction on its new facility in London, Ontario to help bring SulfaCHAR to market and help improve productivity and competitiveness in Canada's emerging biogas industry.
2. That the government of Canada contributes \$10 million in matching funding to help scale CHAR's bio-coal project which will increase productivity in Canada through the use of a new, clean, coal which produces zero GHG emissions.

Considerations

Biogas

Biogas is a renewable source of methane gas, created when organic matter breaks down in an oxygen-free environment. The main component of biogas is methane, also the key component of natural gas. Biogas is a product of the decomposition of organic waste under anaerobic conditions. There are many abundant sources of organic waste, including:

- Manure from dairies;
- Wastewater sludge;
- Municipal solid waste;
- Food waste;
- Yard clippings; and
- Crop residues.

Biogas is a clean, renewable source of energy made up of approximately 50% methane and 50% carbon dioxide (with trace amount of contaminants such as hydrogen sulfide). Hydrogen sulfide is a toxic and corrosive gas that poses operational, health, and environmental hazards at biogas sites.

Farm-based biogas projects using agriculture residues provide opportunities for on-farm revenue diversification through electricity generation, thermal energy capture, and nutrient recovery. Removing hydrogen sulfide (H₂S) from the biogas is essential to ensure safe and efficient plant operation.

With the use of CHAR's *SulfaCHAR* product, this naturally occurring, accessible organic matter can be upgraded to Renewable Natural Gas (RNG), which is carbon neutral and interchangeable with conventional natural gas.

Developed by CHAR Technologies, *SulfaCHAR* is a cost-effective, convenient, zero-waste targeted gas cleaning solution for the growing three billion dollar global problem caused by toxic and corrosive hydrogen sulfide in the renewable natural gas industry. *SulfaCHAR* filters hydrogen sulfide out of renewable natural gas, allowing users to drastically reduce their maintenance costs.

SulfaCHAR is:

- **Cost-effective:** *SulfaCHAR* is the most cost-effective H₂S removal product based on cost per kilogram of H₂S removed, providing over 20% savings compared to similar systems. The simplicity of the system requires little capital infrastructure and low operator attendance, making it an accessible option for facilities of any scale.
- **Convenient:** *SulfaCHAR*'s high sulfur capacity, compared to similar systems, means that the material lasts longer and requires less change outs. *SulfaCHAR* is non-toxic and doesn't solidify into large pieces making it easier to change-out. Minimal monitoring required.
- **Zero-waste:** *SulfaCHAR* is made from organic waste material, such as anaerobic digestate. *SulfaCHAR* converts hydrogen sulfide into beneficial forms of sulfur, allowing spent *SulfaCHAR* to be reused as a sulfur rich biochar fertilizer.

CHAR Technologies' *SulfaCHAR* product is a targeted gas cleaning solution that is simple to operate and implement. The passive system directs untreated biogas through a vessel containing *SulfaCHAR* media. *SulfaCHAR* adsorbs H₂S onto its surface and clean biogas exits the system ready for electricity generation. *SulfaCHAR* is an ideal solution for on-farm anaerobic digesters of any scale.

Benefits include:

- Low capital cost for installation;
- Low operational burdens;
- Reduced downtime and maintenance;
- Eliminates need to store or handle toxic chemicals; and
- Spent material is non-toxic and easily disposable.

The development of biogas projects in Canada has the potential to create significant benefits for the economy, environment, and energy sector. In fact, realizing the full potential of biogas

development would lead to up to 1,800 separate construction projects with a capital investment of \$7 billion and economic spin-off of \$21 billion to the Canadian economy.¹

Utilizing all biogas sources in Canada has the potential to reduce Canada's greenhouse gas emissions by 36.5 million tonnes of CO₂ equivalent per year, which is comparable to taking 7.3 million cars off the road, and utilizing all biogas sources in Canada would generate 810 MW of electricity.²

In North America there are 1,642 agricultural, landfill, and wastewater biogas projects with the potential for 12,260 more projects.³ Biogas has a great future as an energy source and there has never been a better time to work together to seize its potential.

A partnership with government will help CHAR move more quickly with *SulfaCHAR*, increase productivity in the renewable fuels industry, lead to GHG reductions, and create jobs and economic opportunities.

Bio-Coal

CHAR has developed a new bio-coal product that can replace traditional fossil coal, creating an anticipated market of more than \$7.4 billion per year once scaled.

CHAR's bio-coal is developed using made-in-Canada technology that converts existing excess bio-waste from agriculture, forestry, and landfills into a carbon-neutral coal product with **zero** GHG emissions.

CHAR's bio-coal solves three problems.

1. CHAR will source local, existing bio-waste that sits in abundance and create a bio-coal product that is sustainable, efficient, produces zero greenhouse gas emissions, and will create jobs and economic benefits in Ontario.

CHAR plans to utilize naturally existing excess bio-waste in key regions in Ontario to create bio-coal. In Northern Ontario, CHAR will use excess forestry resources to create a GHG-free replacement for traditional fossil coal. CHAR's operations will create jobs in northern Ontario to source the existing forestry, and develop and deliver the completed product.

2. CHAR's bio-coal will help the government phase out coal-fired electricity by 2030 as part of its comprehensive plan to make Canada a leader in green energy, while at the same time, providing industry with the tools to maintain economic production.

¹ Biogas Association, Canadian Biogas Study, 2014.

² Biogas Association, Canadian Biogas Study, 2014.

³ American Biogas Council

As Canada moves forward with plans to eliminate the use of traditional coal-fired electricity by 2030, CHAR can help ease the transition. For example, in New Brunswick, where provincial Crown corporation NB Power operates the Belledune coal-fired plant, rates could increase by as much as 38 per cent to account for the charges associated with decommissioning that plant prematurely, the utility has estimated. The plant, built in 1993, was set to reach the end of its "economic life" in 2043, but the new 2030 alters the economics of amortization.⁴ However, with CHAR's bio-coal, the New Brunswick plant could continue to operate through its economic life, while still contributing to Canada's commitment to reduce greenhouse gas emissions. When burned for energy purposes, CHAR's bio-coal produces zero GHG emissions.

3. CHAR's bio-coal shares many of the chemical properties and traits of traditional fossil coal. This allows for easy industry integration and will allow steel and cement producers to reduce their GHG emissions while maintaining economic production.

CHAR Technologies' bio-coal is a complete substitute for traditional coal for the steel industry, which requires very specific energy and ash rates. CHAR's bio-coal is the only existing GHG free replacement and will help the steel and cement sectors make significant emissions reductions.

Canada's steel industry is part of the Iron & Steel sub-sector, which is part of a much larger Energy sector called Stationary Sources. With all GHG sources combined, the Stationary Energy sector accounts for 45% of Canada's GHG emissions, and specifically, the Iron & Steel sub-sector produces about 1% of Canada's total GHG emissions.⁵ Healthy domestic steel producers are fundamental to a strong manufacturing economy in Canada. Canadian steel products are vital to the automotive, energy, and construction sectors and domestic steel operations directly employ some 22,000 Canadians while supporting an additional 100,000 indirect jobs.⁶ CHAR Technologies' will help ensure productivity in the steel industry while helping to reduce greenhouse gas emissions in an industry that relies on coal.

CHAR Technologies is at the forefront of Canadian green innovation and looks forward to contributing to policy development in a meaningful way. A partnership between the government of Canada and CHAR Technologies will help bring this product to market more quickly, ensuring results as quickly as possible.

⁴ <http://www.cbc.ca/news/politics/canada-coal-country-mckenna-workers-1.3860764>

⁵ Canadian Sheet Steel Building Institute: <http://www.greenstonestructuralsolutions.ca/dev/wp-content/uploads/2016/10/CSSBI-Environmental-fact-sheet-2.pdf>

⁶ Canadian Steel Producers Association: <http://www.canadiansteel.ca/our-public-policy-priorities/>